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The IRON AGE

Vol. 159, No. 5 — January 30, 1947

Editorial

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Technical Articles

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Features

o o o

News and Markets

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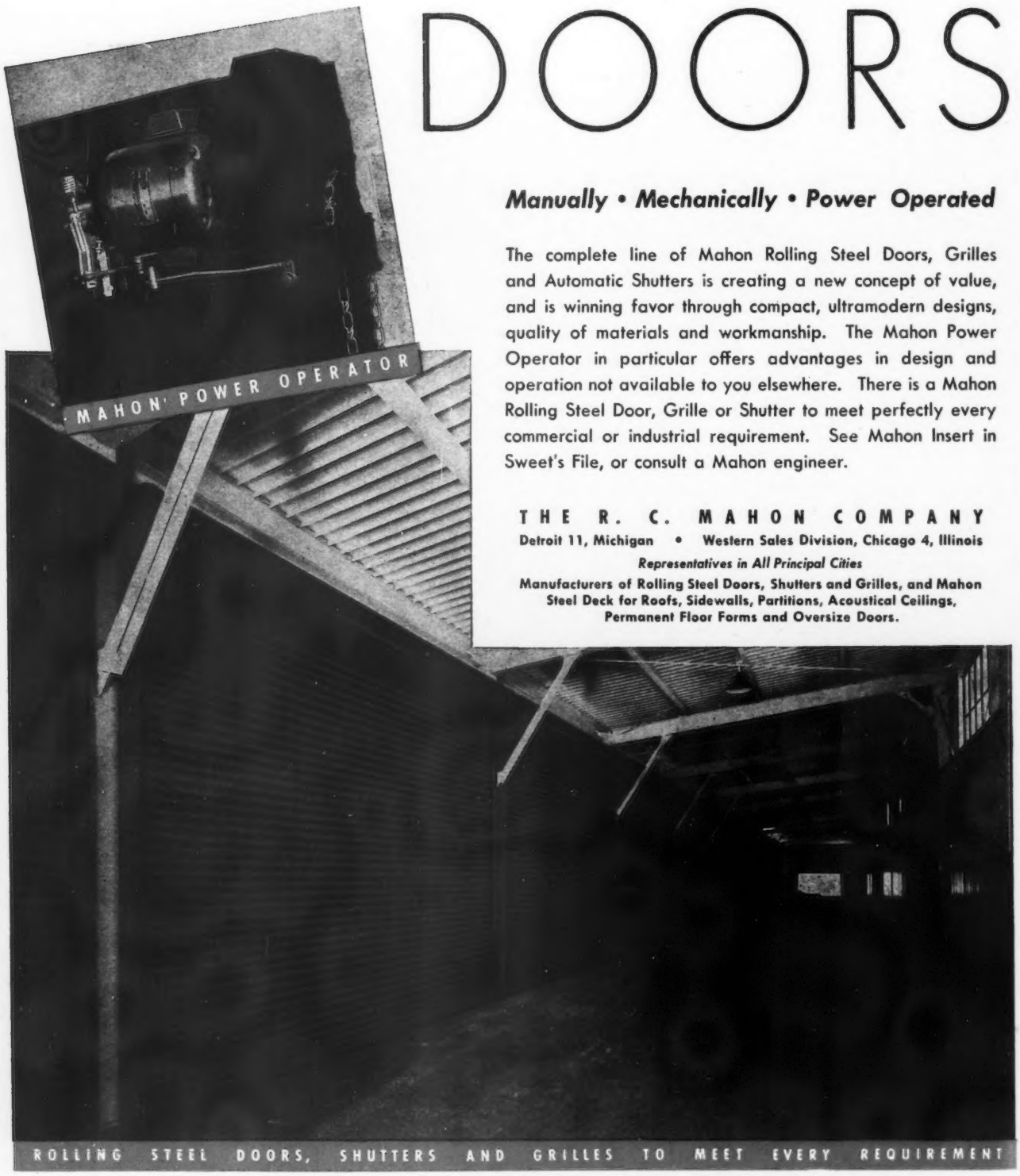
Rolling Steel DOORS



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On Fading Benchmarks

TIME passes and the world changes. And while the average man has an astonishing capacity for struggling against the inevitable, he usually succeeds in making last-minute and reluctant adjustments.

These days, however, the storms of social, economic and political issues seem exceptionally fierce. The eddies of verbal will-o'-the-wisps are turbulent and disquieting as they blast from the radio and chase across the headlines. Even most of the old reliable points of reference —the benchmarks of opinion—seem to be shifting and blurring. The leftish newspaper of yesterday is rightish today; the columnists with ready panaceas abruptly reverse their courses; the political commentators with dogmatic solutions suddenly begin to temporize. For evaluation purposes the common man finds all this very, very puzzling in his agonizing pursuit of answers that never come.

Even such a lesser datum level as the Army Ordnance Association doesn't seem to be staying put. That has been an organization that could always be relied upon for pounding right down the middle of the military party line—constant vigilance, a strong military machine, firm outposts, idealization of top brass, unwavering suspicion of possible enemies, and such.

For a year now the Association has been berating Russia as all evil, with no compensating virtues. That's O.K.—the mind can make the usual adjustment and assume one or two virtues. For instance there's a certain weight of evidence that Russians love their children. Then all of a sudden the Association plumps for "bringing our troops back from the European political mess." That's strictly a Communist objective and certainly doesn't fit into either established American civil policy of winning the peace or military strategy vis-a-vis Russia.

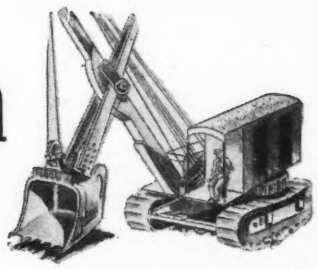
As for American generals, the Association could always be relied upon to portray them as combining the more desirable features of Mother, God, Alexander the Great, Methuselah and Adonis. By applying the standard adjustment, it was always possible to scale the generals away down into a considerably more earthy niche.

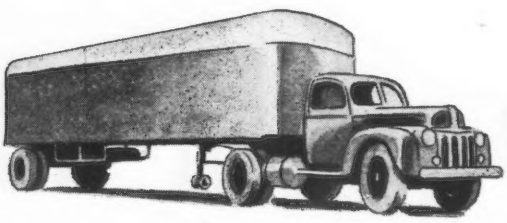
The blinding popular approval of General Marshall's appointment as Secretary of State would seem to afford the Association opportunity for a super deluxe job of idealization. But all of a sudden they come through with a snappy haymaker, like . . . "General Marshall is by no means the greatest military mind, or strategist or administrator of our history . . . when the archives of World War II become public property . . . the statures of many of our career military commanders will shrink even further, General Marshall's among them . . . he is of less patience than his distinguished predecessor."

It's all pretty disconcerting. If Pegler starts writing "My Day" there'll be hardly a thing left to tie to.

T. W. Lippert

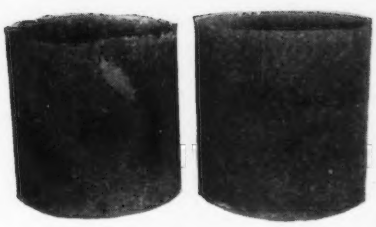
increase strength





reduce weight

resist corrosion



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► Some steel companies have given a lot of study to guaranteed wage plans but present indications are that the steelworkers' union demands for such a plan will be turned down at this time. However, unconfirmed reports that it may be considered later and that it might be tied up with a 10-pct increase in worker productivity as a quid pro quo indicate the issue is still alive in the minds of some steel executives.

► Holland, which flies all its overseas airmail by KLM Royal Dutch Airlines, has just reduced overseas postage rates--making the Netherlands and Switzerland the only two countries in the world which carry all overseas mail by air without extra charge.

► Some 45,000 employees and former employees of Wright Aeronautical Co. are being asked by the union for a $1 contribution to a fund being raised for portal-to-portal suits. It appears that those who don't sign up and pay their dollar will not be represented in the proposed suit--nor do they stand to collect if the union wins.

► Cast magnesium aircraft wings are in the advanced stage of development and will soon be tested on a high speed plane now being manufactured by an American company. The process casts the skin and reinforcing members into integral interlocking panels in a standard magnesium alloy. The wings are reported to be symmetrical in design, so that the top of the right wing is identical with the bottom of the left wing and vice versa.

► Recent Congressional questioning of U. S. mobilization prior to World War II merely recalls the fact that the U. S. has not now--and never did have--a real program of industrial mobilization and planning for war. Army concern on this question is tied in with facts such as the 8 years it took to build the B-29 and our inability to put a single plane designed during the war into combat.

► The only substantial possibility for relief for Britain's sheet consumer this year is curtailment in the use of steel for prefabricated housing there. The program calling for use of steel frames and some strip has been cancelled and auto producers will be hungrily eyeing the material.

Unless they succeed in getting bigger steel allocations British automakers will probably not top 400,000 units although they had hoped to reach half a million in 1947.

► Alcoa has developed a new aging treatment for 75S aluminum sheet which permits the entire aging cycle to be completed in an 8-hr shift, a 50-pct time reduction of particular interest to plants working a single 8-hr shift.

► A new automatic induction heating unit for case hardening wrist pins eliminates a whole series of manual operations and promises to permit hardening of a 2.75-in. pin with not more than 0.866-in. OD at the rate of 1000 per hr at a cost of about 1/10¢ per pin.

► Unlike most other metalworking operations where jobs this year and next will be below the wartime level, foundries, according to the Dept. of Labor, are likely to need at least as many workers in 1947 and 1948 as they had at war's end. After the next several years employment in foundries is expected to drop, largely as a result of technical progress.

► Westinghouse is working on a compact light-weight speed reduction gear which it is hoped will speed development of a new type of commercial airplane powered by a geared gas turbine.

► Escaping the glare of publicity is the quiet USWA demand for separation payment or a dismissal wage in case of layoffs. Best bet is that something along this line will be worked out soon if not during the present negotiations. Both sides agree on the humane principle involved.

► Designed for polishing stainless steel, glass and non-ferrous metals is a new Raybestos-Manhattan grinding wheel fabricated of Neoprene impregnated with abrasive grain.

► The $4260 million bill for nationalizing the British transport industry is believed to be the largest and most expensive socialization measure ever presented to a democratic legislative body. Of the 18 million persons engaged in British industry, 1¼ million are affected by the bill. Compensation will follow the government policy of paying for socialization by substituting one piece of paper for another.

Some Metallurgical Aspects of

o o o

By JOHN C. REDMOND
Research Engineer
Kennametal, Inc.,
Latrobe, Pa.

o o o

USE of cemented compositions of the refractory metal carbides for tool and wear and many other applications has grown to large proportions without fundamental nature of this material being generally understood. It is commonly known that these compositions are made by the processes of powder metallurgy by ball milling finely divided carbides together with an auxiliary metal, usually cobalt, followed by pressing the powders to the desired shape and sintering to harden. Much has been published concerning the practical use of these materials. However, little has been made available as to the basic reactions involved and their metallurgical properties.

Although there remains much to be learned concerning the nature and fundamental behavior of cemented carbides, the last few years have seen a great deal added to the knowledge of these materials. As with other metallurgical products, knowledge of their basic nature and properties aids greatly in making practical applications. The purpose of this article is therefore to summarize the knowledge to date of these materials as well as to discuss some recent developments.

The term "cemented carbides" is considerably misleading in that it ignores the primary function of the auxiliary metal. The fact that the auxiliary metal serves not merely as a cement becomes evident when it is considered that, of the many metals which might appear to be satisfactory on first inspection, only one, cobalt, has ever come into widespread commercial use. Some others, particularly nickel, have been used commercially, but in the end have been found deficient in comparison with cobalt. If it were a question only of purely physical cementing, several other elements would meet the requirements.

TABLE I

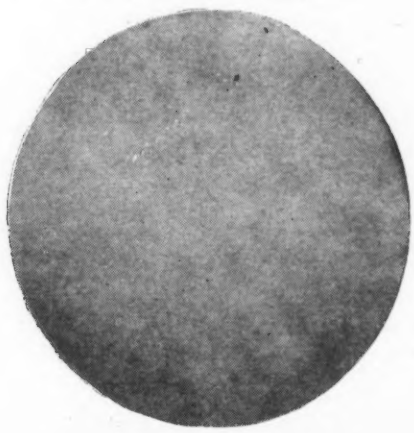
Comparison in Density Between Structures Shown in Figs. 1 and 2

	Apparent Density, G per cc	Absolute Density, G per cc	Percent Voids
Piece 1.....	12.15	12.26	0.85
Piece 2.....	11.89	12.28	3.3

Studies of the events which take place during the sintering operations have shown that true metallurgical mechanisms are involved and hence many more conditions must be satisfied than as if mechanical cementing alone took place.

It is now quite well established that the main function of the auxiliary metal during sintering is that of serving as a solvent for the carbides so that the carbide particles may merge, eventually forming a continuous skeleton of carbide. Dawihl and Hinuber[1] have shown that this skeleton does exist in sintered compositions by leaching test pieces of tungsten carbide and varying percentages of cobalt in dilute hydrochloric acid solutions. After sufficient leaching time the cobalt was completely removed but the test pieces held their original shape. Microscopic examination showed that all the tungsten carbide particles were joined together in a continuous skeleton and these structures were found to have transverse rupture strengths as high as 77,000 psi, a fair percentage of that of the unleached composition. Thus, the auxiliary metal serves a very important function in providing the means for the carbide particles to join themselves together. These skeletons thus contribute to the completed composition a large proportion of its strength, much more than would be obtained from mere adhesive action of the auxiliary metal and more strength than even the unalloyed auxiliary metal alone could have. In the cooled sintered tip the auxiliary metal phase probably provides a cushion-

FIG. 1—Illustrates low porosity in a carbide specimen; unetched, 35X.



Cemented Carbides . . .

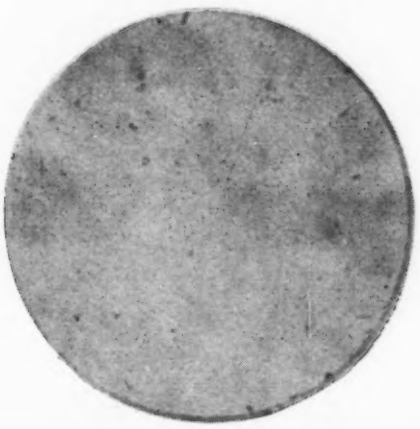
The fact that a cemented carbide composition is never entirely molten, introduces many metallurgical problems. Moreover, as pointed out by the author, the performance of carbide tools is often as much a matter of the manufacturing technique used as of the chemical composition. Various factors such as grain size and porosity and their effects on physical properties are also discussed.

ing or stiffening action which further strengthens the composite structure.

This work of Dawihl and Hinuber confirms and amplifies the findings of Takeda[2] who studied, by means of X-ray diffraction, the systems of tungsten carbide with iron, cobalt, and nickel, and concluded that cobalt would serve as the best auxiliary metal. It will be seen that the binder metal, as it is sometimes called, must be one in which tungsten carbide is soluble in reasonably high percentage at sintering temperature, yet which has little retention at ordinary temperatures, and, in addition, the physical properties of the matrix phase, of which the auxiliary metal is the main constituent, must be suitable. Further, the metal must have no affinity for carbon, so as not to decompose the carbides. When all these factors are considered, it becomes obvious that there is a wide difference in the behavior of the various elements which might be used as binder metals. Takeda concluded that cobalt would be a far more satisfactory binder than iron or nickel because it retains only a small percentage of tungsten carbide in solution on cooling. It may be further remarked that cobalt has very little affinity for carbon compared to iron so that there is no tendency for cobalt to decompose the carbide.

Many more factors enter into the consideration of cemented carbides. For instance, what has been said above applies to compositions containing only tungsten carbide with the auxiliary metal. Probably the majority of the compositions now used commercially contain in addition one or more other carbides, particularly titanium carbide, and compositions containing no tungsten carbide but, for instance, molybdenum and titanium carbides, vanadium and titanium carbides, or even one of them alone, have had at least limited commercial use. Very little fundamental information is available concerning the systems of these other carbides either individually with auxiliary metal or in compositions containing more than one carbide. Some preliminary work in the Kennametal laboratory indicates clearly that other carbides behave quite differently from tungsten carbide from a metallurgical point of view, at least in degree. These differences in behavior might well explain the differences in their performance as tools.

FIG. 2—Porosity is increased, as compared with fig. 1, due to slight change in production technique; unetched, 35X.



The formation of solid solutions of the various carbides in each other, analogous to alloying in metals, has been well known for some years and much has been published on this subject.[3, 4] However, quantitative measurements of this type have been until recently only very rough so that accurate information has not been obtainable. In the near future much more accurate information obtained by the use of the new X-ray diffraction techniques will undoubtedly be available.[5] However, at present the existing information is valuable only in research and investigation of compositions and processes as an aid in identification of grades and in process control and not as a guide in tool selection.

Even though the manufacture of cemented carbide compositions is truly a metallurgical operation, the fact that the composition is never wholly molten introduces many problems. In fact, the choice of method of manufacture is highly important, and the performance of carbide tools is often as much a matter of the techniques used as of the chemical composition. The micro-

TABLE II

Comparison of Physical Properties of Carbide A (Fig. 7) and Carbide B (Fig. 8)

	Hardness, Ra	Transverse Rupture Strength, Psi
Carbide A	91.0	305,000
Carbide B	91.3	225,000

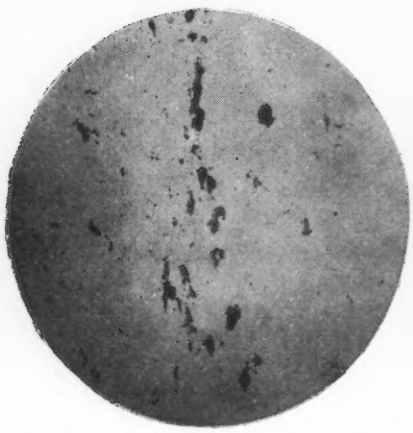


FIG. 3—Cast cobalt-chromium-tungsten alloy; unetched, 35X.

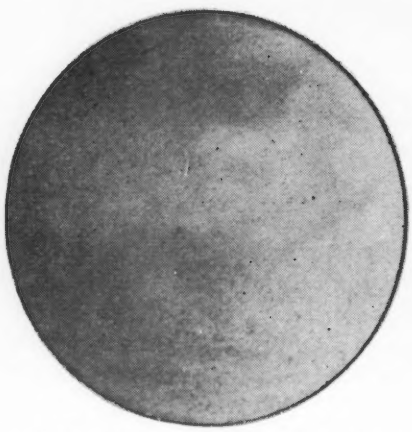


FIG. 4—High-speed tool steel; unetched, 35X.

FIG. 5—Low porosity discernible in a carbide specimen at higher magnification; unetched, 400X.

scope has been found highly useful as a means of determining the differences in structure which result from the use of different practices.

One type of defect which is detrimental to good compositions is the presence of pores. In the use of cemented carbide cutting tools, edges are often honed because of the importance of the finish of the cutting edge. It is evident that even a small break in such an edge may result in rapid failure. Micrographs at relatively low magnification on a polished but unetched specimen readily disclose this porosity. The micrographs, figs. 1 and 2, are of identical commercial composition, polished with U. S. Bureau of Standards' No. 1 diamond dust and photographed at 35 magnification. The difference in porosity, which is due to a slight change in the manufacturing technique, is quite obvious.

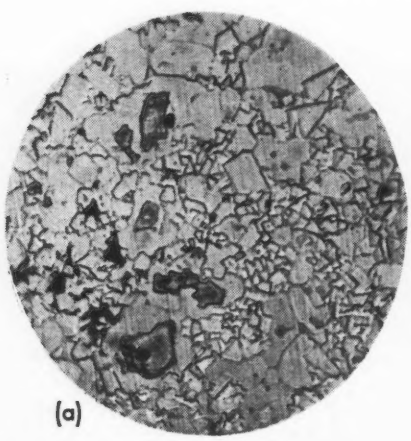
The ability of powder metallurgy processes to produce sound materials is often questioned. The micrographs in fig. 3 of cast Co-Cr-W alloy and in fig. 4 of high-speed steel, both at 35 magnification, show that the best cemented carbides as illustrated in fig. 1 are superior in soundness to older materials made by conventional methods.

The quantitative measurement of porosity by microscopic methods is quite difficult, but a quantitative measure may be obtained by density methods. The apparent density of the solid piece of carbide is first obtained by a refined water displacement method, which gives results accurate to ± 0.01 specific gravity. The solid piece is then crushed by means of a carbide mortar and pestle to pass a 200-mesh sieve. The true density of the powdered material is then obtained using a helium densitometer which gives results accurate to about ± 0.02 specific gravity.[6] In this way the effect of slight differences in composition is eliminated. From the difference in the two values the percentage volume of voids may be calculated. The above technique was applied to the pieces of carbide shown in figs. 1 and 2 with the results shown in table I. It will be observed that in the case of Piece 1, the apparent density is very close to the theoretical absolute density.

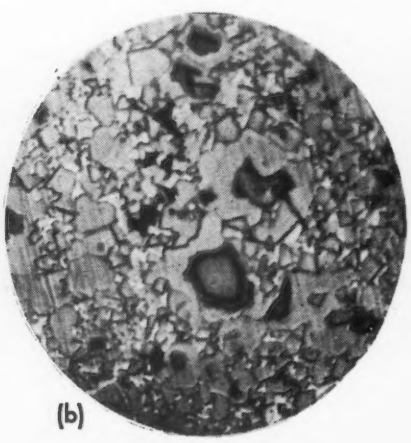
Even porosity which appears at a magnification of 250 to 400 diam is considered detrimental to good tool performance. Here again wide differences are found by microscopic examination as shown by the micrographs, figs. 5 and 6, of two comparable compositions made by different techniques. These are of diamond lapped surfaces at 400 diam, unetched.

Since the reactions which take place during sintering are in the nature of diffusion reactions, a small initial grain size and a range of grain size are necessary to assure intimate contact of the various particles. However, by the very nature of the sintering reactions as

FIG. 8—Microphotographs representative of the structure of carbide B (Table II). Micros (a) and (b) were taken at similar intervals of a series, along parallel lines, locations being comparable with fig. 7 (a) and (b); alkali ferricyanide etch, 1500X.

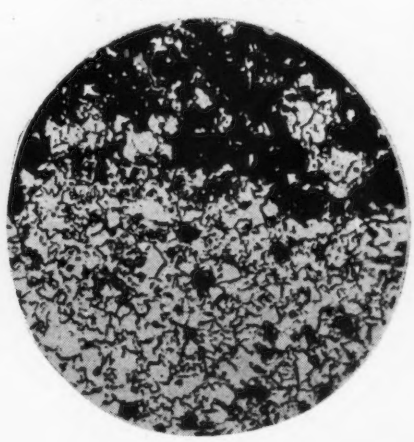


(a)



(b)

FIG. 9—An extremely porous structure, sometimes encountered in straight tungsten carbide compositions; alkali ferricyanide etch, 1500X.



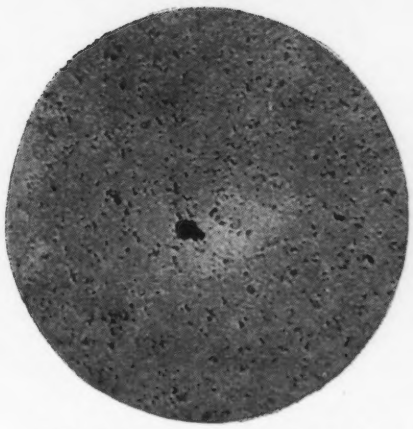


FIG. 6—Increase in porosity, as compared with fig. 5, due to different production technique; unetched, 400X.

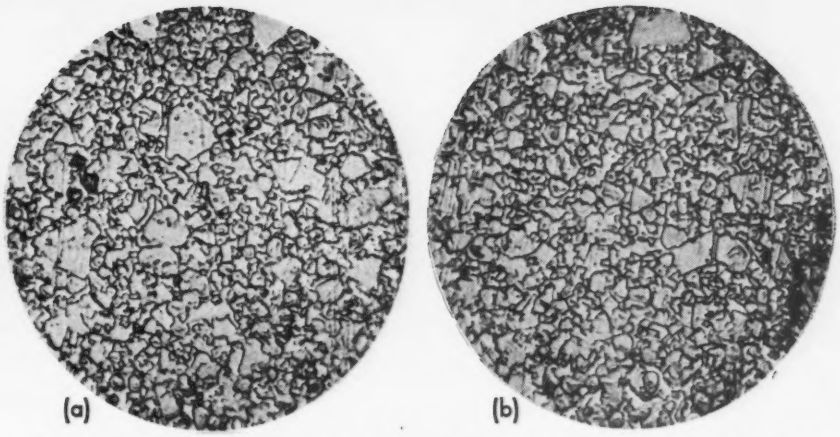


FIG. 7—Micrographs representative of the structure of carbide A (Table II). Micros (a) and (b) were taken at similar intervals of a series, along parallel lines, locations being comparable with fig. 8 (a) and (b); alkali ferricyanide etch, 1500X.

described above, grain growth is inherent in the process. Further, the hardness and strength decrease with increase in grain size, but the grain size of the sintered pieces cannot be reduced by subsequent heat treatment or cold working operations as with other metallurgical products.[1] Hence, careful control of the physical conditions of the carbides going into the mixture together with proper control of the sintering operation is essential.

In view of these considerations, although the usual information obtained from microscopic examination is not obtained when examining cemented carbides, the microstructure as seen at high magnification still reveals much concerning the quality. The magnification usually used is 1500 diam., which necessitates the most careful polishing and etching techniques. The use of diamond impregnated laps has been found best and the standard etch is alkali ferricyanide. Since only a small field of view is covered at such high magnification, it is best to take several micrographs according to a pattern. Such a series of ten micrographs each of two comparable steel cutting compositions was inspected. In each case the photos were taken on two parallel lines running the length of the tip and 5 mm (0.197 in.) apart. The spacing between each view was 3 mm (0.1181 in.).

Figs. 7 and 8 are representative of the microstructures of the two carbides, A and B, respectively, at similar locations.*

Many differences are evident in the two series of micrographs. In fig. 7, it will be seen that the structure of carbide A is generally sound with a uniformity of range of grain size and of grain size distribution. No very large particles are in evidence. The excellent "keying" should also be noted. On the contrary, in fig. 8, of carbide B there is evidence of microporosity in several of the views and there are large grains of tungsten carbide in evidence. The wide range of particle size between large and small grains is quite evident. These differences in structure correlate well with the differences in the standard properties as shown in table II.

Some preliminary tests have also indicated that the impact strength which would be important in milling and interrupted cuts is several times higher in the case of carbide A than of carbide B. Higher compressive strength, torsion strength and other properties would also be expected.

What has been said of the microstructure and properties of the steel cutting compositions applies to almost the same degree to straight tungsten carbide type

(CONTINUED ON PAGE 150)

The author submitted photomicrographs illustrating the structure at the intervals stated. In order to eliminate duplication in presentation of similar structures the micros shown in figs 7 and 8 were selected as representative.—Ed.

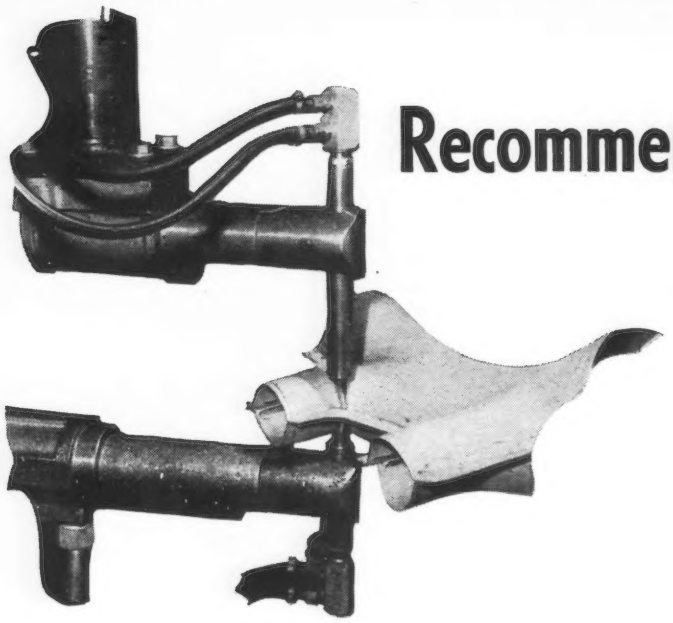
LEFT

FIG. 10—Excessive grain growth, as sometimes encountered in straight tungsten carbide compositions; alkali ferricyanide etch, 1500X.

o o o

RIGHT

FIG. 11—A preferred material showing sound structure, uniformity of grain size and not too excessive an average grain size.



Recommended Spotwelding Procedures

o o o

By FREDERICK S. DEVER
Spotwelding Supervisor
Ryan Aeronautical Co.,
San Diego

o o o

DURING the past decade spotwelding in the aircraft industry has grown from a fabricating process, little used except for secondary structures that were lightly stressed, to a method that is successful in many primary structure applications. This has come about because of the increased knowledge of equipment and its use which has improved the shear strength and consistency of spotwelds.

Since the strength of the spotweld must, of necessity, be a shear function it follows that the design of the parts to be welded can make or break the resultant assembly as far as satisfactory service operation is concerned. While it is difficult to list any given set of conditions as a criterion for good design, the following suggestions should produce desirable results:

(1) Loads to be applied to spotwelds should be shear loads because spotwelds will inherently develop focal points of stress concentration at the edges of the weld and the inner faces of the sheets if tension or angle loads are applied.

(2) Tension loadings should never be used because the strengths developed in tension are erratic and cannot be relied upon.

(3) Compression loadings are satisfactory providing the design will not allow the spotweld to be placed in tension as a result of a shifting or a movement of this compression loading. An assembly made from light gage material demands special care to assure that the stress does not occur in a plane which will cause buckling as this may change the spotweld loading from shear to tension.

(4) Ample edge distances must be maintained. This is necessary in order to have a sufficient area, surrounding the spotweld, over which the pressure can be applied, and to have an adequate amount of wrought material so that the stresses can be carried over and around the cast spotweld metal.

The required edge distance will vary depending upon the type and thickness of the material. It must be remembered that as the material thickness increases, the diameter of the spotweld must be increased to meet the minimum required shear loadings. Spotweld diameters for different metal thicknesses and minimum edge distances are given in figs. 1 and 2.

Spotweld patterns (spot groupings) are of great importance in the design of spotweld structures. They are similar to rivet patterns and spacing used to obtain high joint efficiency, and can be divided into three rough classifications:

(1) *Single row,* in which a single row of spotwelds with a definite center to center dimension is used. This joint pattern will require a minimum of overlapping of the sheets. The overlap will be determined by the material thicknesses being used which, in turn through the minimum shear strengths required, will determine the other dimensions such as spotweld diameter and edge distance. Center to center spacings and joint efficiency are shown in fig. 3, with recommended dimensions.

(2) *Double row.* This design requires a greater overlap of material, but the joint efficiency will be from 95 to 100 pct if the spotweld spacings given in fig. 4 are used. It is often good practice to utilize the double row pattern even though spotweld strengths may be below average minimum. This is because this pattern will evenly distribute the loading and result in an assembly giving a longer and more satisfactory service life than a single row of spotwelds of higher average shear values. The double row joint under severe vibration and fatigue stress has been found to be more suitable.

(3) *Double row staggered.* In this pattern the joint efficiency is approximately equal to the double row pattern. The pattern, however, of the double row staggered is not as well stressed. There is considerable difference of opinion as to which joint is the more efficient for general service usage. The material overlap in the double row staggered is less than in the case of the double row spotwelded joint.

The materials which can be spotwelded are almost unlimited, although those which develop extreme hardness as a result of heat treatment may present difficulties rendering spotwelding unsuitable. An example of such a material would be X4130 or 4140 steel. Because of the marked reaction of these air hardening steels, with resultant shrinkage and extreme thermal stresses, the formation of sound and uniform spots would not be possible. The aluminum and

stainless alloys, low carbon, and some other alloy steels all lend themselves to satisfactory spotwelding. There is, however, a marked difference between the treatment of these materials.

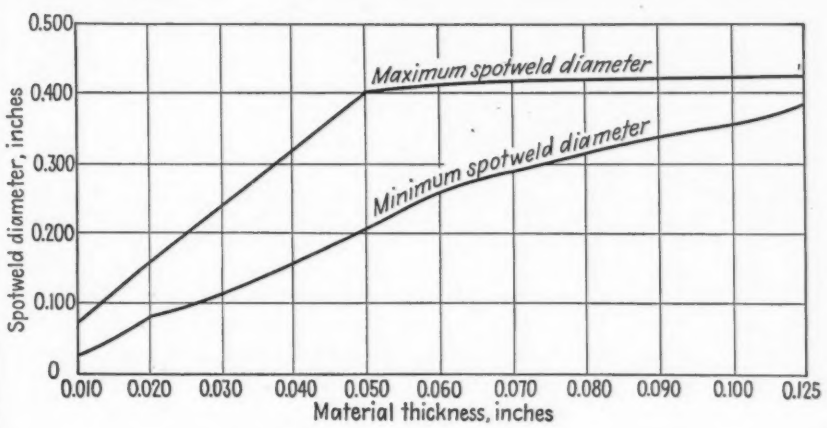
During the past few years the spotwelding of attaching plates or lugs to armor plate has been accomplished with considerable success. Because of the success in this field many spotweld technicians believe that with research and development, many more alloy steels may be spotwelded in the future. This is a field which is not being actively explored and is the subject of research investigations at Ryan.

Materials having resistance of equal value can be spotwelded together even though their chemical composition is not the same. It is preferable, however, to weld materials of similar composition. In the aluminum alloys the electrical resistance will vary according to the chemical composition of a given alloy. The thinnest sheet is the determining factor in developing strengths of the spotweld. For this reason the designer must bear in mind that a wide variation in sheet thicknesses is not desirable because only a small proportion of the total strength of the thicker member can be utilized. Keeping the thicknesses of the gages to be spotwelded as similar as possible allows for uniform penetration, rapid production and tends to prevent critical spotwelding conditions. A ratio of 3½ to 1 thickness limits between two sheets should not be exceeded.

In the absence of a design manual the designers should consult the production man for the dimensions and clearances necessary to use the existing spotwelding equipment. This is sound practice because, while the gage combinations may be well within the capacity of the machine, sufficient head clearance must be allowed around the electrodes so that the holders and electrodes may enter the area to be spotwelded. The use of this type of information by the design engineer, together with spotweld diameter, edge distance, spot pattern and spacing, will yield twofold results, sound design and increased production. Below are listed a few recommendations gathered from Ryan experience as to the type of information the designer should have at hand:

(1) Throat depth of spotwelder.
(2) Distance between arms.
(3) Diameter of electrode holders.
(4) Dimensions and shapes of standard electrodes commonly used by the production department.
(5) Angular setups possible on the machines available.
(6) Special electrodes such as offset and others which are available.
(7) Minimum and maximum clearances required by production for the fabrication of channels, hat sections, Z bars and others.

While it is not the intent of this discussion to persuade the reader that spotwelding is an all-purpose method of manufacturing, there are, nevertheless, many cases in which spotwelding can replace rivets in lightly stressed assemblies. In some instances the substitution can be made direct, while in others a slight modification in the design of the part may be required. Where redesign is indicated, the increased production and decreased cost will most certainly offset the expense incurred.



ABOVE

FIG. 1—Chart showing the recommended maximum and minimum spotweld diameters for various thicknesses of material.

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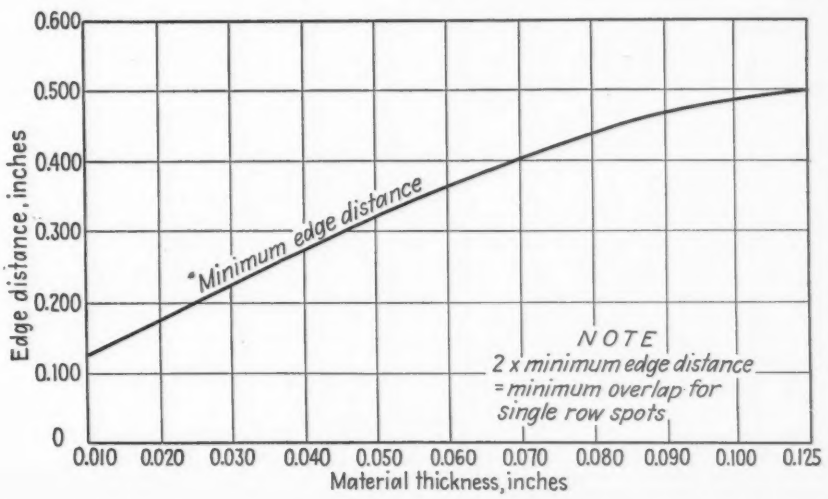
RIGHT

FIG. 2—Good design demands that sufficient edge distance be allowed at all times. This chart gives the recommended minimum edge distances for different metal thicknesses.



Preparation

Because of the high electrical conductivity and rapid heat transfer which is characteristic of aluminum alloys, extreme care must be taken in their preparation for spotwelding. Surface cleanliness is one of the primary requisites for consistency in the spotwelding of these alloys.

The cleaning operation will vary, depending upon the material. The principal function of this cleaning operation is to remove oils, greases and general contamination, and to

free the surface of any contaminants whose electrical resistance would prevent a uniform current flow through the material. Considerable literature is available regarding the most suitable cleaning methods and only a brief word or two will be mentioned here.

Roughly, the cleaning is divided into two general types: (1) Mechanical brushing in which wire brushes or, in some cases, rubber bonded abrasive wheels will lightly polish the surface of the material in the weld area. The initial cost of this equipment is rather low, although the labor cost is quite high. Because of the difficulty of obtaining consistently uniform results, and because of the danger of removing the protective layer of aluminum from alclad, this method has not achieved general use. (2) Chemical solutions. A wide variety of chemical solutions are available, all of which essentially perform the following functions:

Step 1. Removal of oil and grease.
Step 2. Rinsing.
Step 3. Removal of oxide and establishing a uniform surface.
Step 4. Rinsing and drying.

Stainless steels (18-8 type) may be satisfactorily cleaned for spotwelding by one of two methods: Annealing, followed by a chemical pickle and rinsing, or, in the event the parts are oily and greasy, removal of the oils and greases followed by rinsing and then a light acid etching.

Steel parts which have been sandblasted have a surface which renders them unsuitable for spotwelding since a certain amount of silica from the sand is entrapped or embedded in the metal surfaces. These silica particles offer considerable resistance to electrical current flow and this bypassing seriously affects spotweld consistency. Moreover the roughened surface prevents the development of a uniform electrical contact and current flow so that the spotweld varies in strength and is usually below minimum requirements.

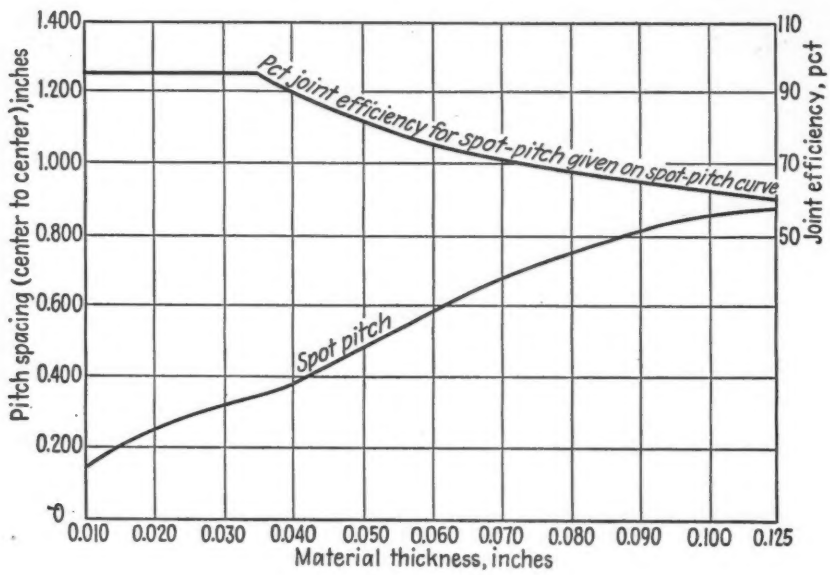
Parts which have been sandblasted can be prepared for spotwelding by annealing at a scaling temperature, followed by a regular stainless steel chemical pickle. In some cases of severe sandblasting it may be necessary to scale and pickle the parts twice.

Following the cleaning and drying of the parts, the next general operation is assembling. Because these assemblies are normally handled by the spotwelder and his helper, small assemblies are the rule, and weight is usually limited. The assemblies are secured by either spot-tacking or mechanical Cleco fasteners or clamps.

Considerable difficulty can be caused for the spotwelder if the assemblies are not handled in such a manner as to keep them clean. Chips lodged between sheets, oils, greases and general contamination which can mar the surface of these parts during assembly can cause trouble.

Equipment

In spotwelding the assembly, the machine must first be set up. This consists of adjusting the arms, electrodes and other elements of the machine to enable it to perform the job. The machine settings are obtained from charts previously established on certification tests of



ABOVE

FIG. 3—For single row spotwelds the efficiency of the joint can be found from the upper curve when the recommended spot pitch is used as shown on the lower curve.

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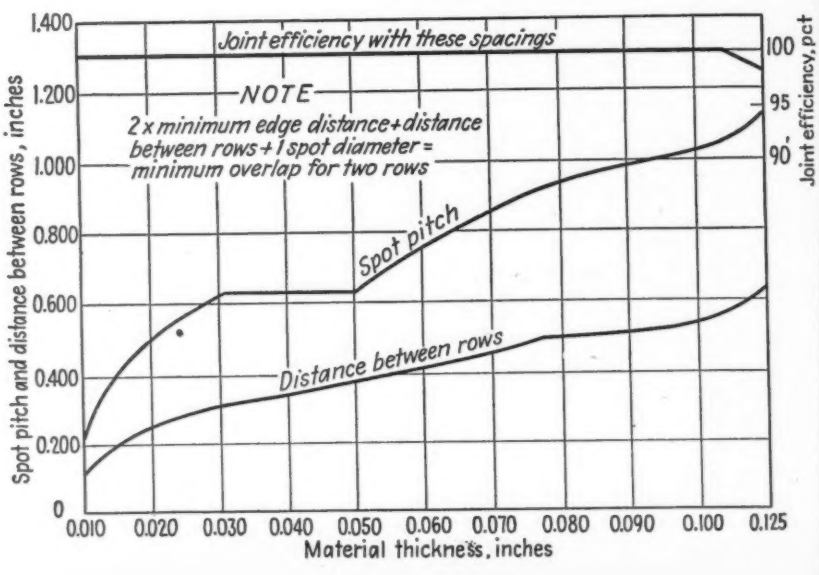
FIG. 4—Joint efficiency curve for two and three row patterns when using spot pitch and distance between rows shown in the lower curves.



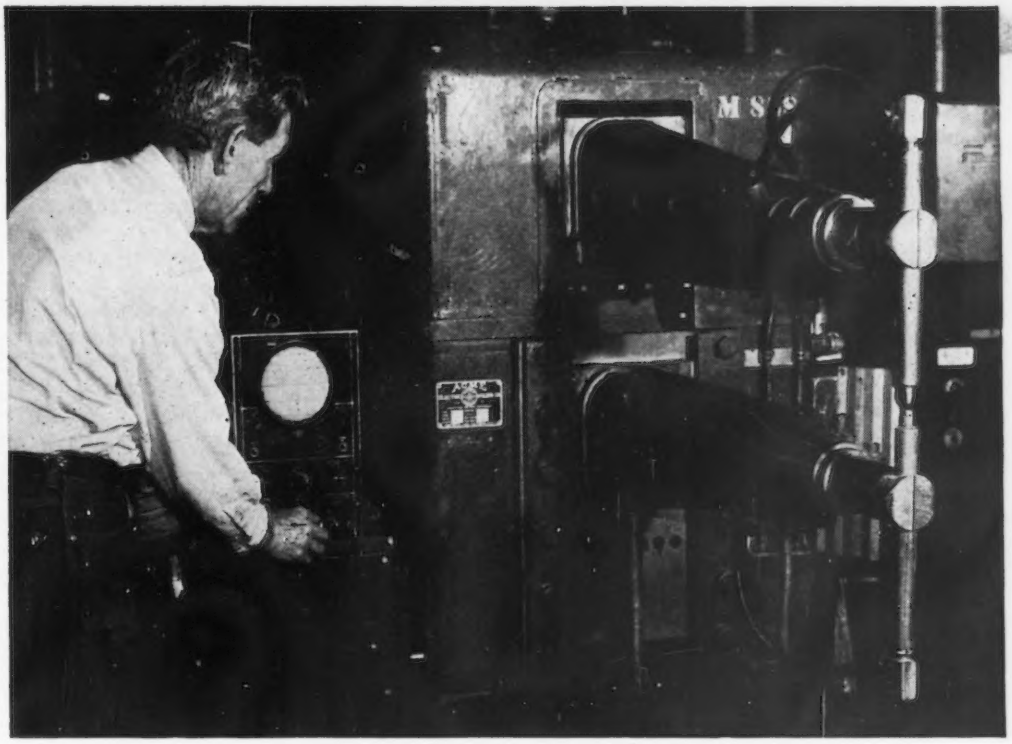


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FIG. 5—Checking the timing cycle of a spotwelder by means of an oscillograph should be a routine maintenance operation if consistently good welds are to be obtained.

o o o

the machine and, of course, will be those settings for the gage combinations about to be spotwelded. After the setup is complete, sample test coupons are spotwelded and immediately tested. Obviously, sufficient time would not be available for a complete test and for this reason a shear test is sufficient to allow the work to proceed. After the test samples have been tested and approved by the inspector, the welder is ready for production.

The type and capacity of the spotwelding machines will depend upon the materials being spotwelded and the thicknesses. It is recommended that machine capacity in all cases be sufficiently great so that a reserve of capacity is present for all jobs. Operating near the maximum current capacity of the machine is undesirable because the machines are not too stable at the upper limits of their rated capacities.

The approximate welding current required for 18-8 steels is about 4750 amp for two sheets of 0.016-in. material. For two sheets of 0.125-in. material the amperage required is about 13,500. Contrast this with the aluminum alloys in which two sheets of 0.125-in. material will require about 35,000 amp.

The required secondary amperage may be obtained from either the ac transformer spotwelder or a stored energy type. If an ample power supply is available, the ac welders will function satisfactorily within their rated capacity. However, since the secondary or welding amperage is directly related to the power input through the primary, it must be understood that any variation of the current through the primary will either raise or lower the secondary current used to form the spotweld. This variation may be sufficient to develop inconsistent spotwelds. Power variation has been a problem and still causes considerable trouble when the power lines are overloaded. The installation of a separate transformer for each welder will produce the desired results of spotweld consistency but the expense incurred must be considered. Another approach to this problem of current delivery and supply is by the use of the interlocking system where two or more welders receive their current in such a way so that only one welder can use the power input at any given time that a spotweld is made.

In cases where a heavy power loading is the general rule, it is the practice at Ryan to use a condenser discharge or stored energy type of spotwelder. These welders store the primary current until the condenser is loaded before discharging the current. This type of welder has reached a high degree of popularity for aircraft spotwelding.

In addition to the delivery of high amperage current, there is another extremely important factor. That is the time interval, or weld time, during which the current flows. Since welds are made because of the heat which this current develops, the time that it flows will directly affect the spotweld. This flow is of very short duration and the timing must be quite accurate, see fig. 5. Two means are available for controlling this interval: The mechanical timer, which is governed by a synchronous speed motor, and the electronic control.

The spotwelding machine must be certified for each gage combination used. This certification for the equipment is obtained by meeting the following requirements of specifications PW6 issued by the U. S. Navy, Bureau of Aeronautics:

(1) Twenty-five specimens shall be made with a single spot on the gage combination to be certified.

(2) The spotweld specimens shall equal or exceed the minimum shear value for the lightest gage in any combination being tested.

(3) In 21 of the 25 specimens the variation in strength shall not exceed 10 pct of the average value of the 25 specimens. The remaining 4

specimens shall not vary over 20 pct of the group average.

(4) Twenty-five single spot specimens shall be sectioned and etched to show the internal structure of the spotweld. These spotwelds shall be reasonably free from porosity and cracks. Certain minor defects may be allowed, providing they are within the specified limits.

There are additional requirements to be met in the specification, but the above are essentially the most important considerations. The requirements of the Army specifications covering resistance welding No. 20011-C are very similar to the requirements of the Navy specification mentioned above. The Navy specification requires tension tests on spotwelds which are not indicative of the service loads to be expected, but which will definitely establish such other factors as uniformity of spot diameter, penetration and soundness of the spotwelds. The Army specification does not require tension tests on spotwelds.

From these specifications two conclusions can be drawn: The one of greatest importance is that spot or resistance welding is an accepted method of fabrication, and that the process must be carefully controlled in normal, routine shop operation in order to be able consistently to meet the requirements of the rigid tests covering the certification of spotwelding equipment. It should also be noted that the amount of inspection to which this process is subjected, both in certification of the equipment and during fabrication, exceeds that required for arc and gas welding. For this reason it is logical to assume that considerable improvement can be expected in the future to reduce the severe inspection requirements and point the way toward a demand that the equipment be more foolproof.

It is the practice for aircraft companies to set their minimum shear strength requirements 5 to 10 pct above the minimum demanded by the Army and Navy specifications. This practice safeguards the fabricator so that in no case will a spotweld on the border line of the company's minimum shear value fall below the AN standards.

Shear strength values for a given gage combination, taken over a period of months, have proved that the shear values from 10 to 15 pct above company minimum are the easiest to maintain. An adherence to these percentages will result in satisfactory spotweld consistency.

It may seem somewhat ambiguous, but by holding to these figures the natural tendency toward obtaining extremely high values over the minimum requirements will be avoided. These extremely high values are undesirable because uniformity in shear values between individual spotwelds in the same assembly is difficult to maintain. Even though all of the values obtained are above the minimum required, a wide variation in strengths above this minimum still represents spotweld inconsistency that should be avoided. At Ryan Aeronautical Co. it has been found that the larger the weld area, the less the ductility, and the extremely high spotweld values which can be obtained for a short time are accompanied by erratic results.

In spotwelding an assembly, the operator must exercise care to keep the electrodes clean at all times. Aluminum alloys are prone to surface alloy with the copper alloy electrodes. When this occurs, the increased resistance developed at the point of the electrode makes for irregular welds and prevents uniform current delivery. The operator should see that the edge distance and spacing is properly maintained and also that the spotweld pattern is symmetrical and uniform in size.

During production runs, the inspector will check the machine at regular intervals for shear strength and appearance of the spotwelds. At longer intervals metallographic examinations will be conducted. This metallographic examination can be conducted by the men in the shop by simply sectioning through the spotweld, etching lightly and examining with a magnifying glass. In cases of doubt the parts can be referred to laboratory technicians for complete metallographic examinations. Should the shear strengths be below the allowable minimum, or should such internal defects as cracks and inclusions exceed the allowable percentages, the machine is removed from production until settings and adjustments are made that will produce satisfactory results.

Since there are so many variables which can cause defective spots, a word of caution is injected here. In making setups the operator or setup man should be aware of the fact that improper cooling of the electrodes, improperly dressed tips, too wide a variation from standard settings, improperly cleaned materials, as well as many other factors, can produce spotwelds of unacceptable consistency. For this reason, at this point in the operation the production man can save himself considerable difficulty by exercising his full ability to do a good job in setting up the machine.

Inspection

Inspection of the spotwelded assemblies and parts is an important phase of the work. The inspector is confronted with the same problem which faces an inspector of arcwelded material in that the method of inspection and testing is nondestructive. Listed below are a few general suggestions which, if followed by the inspector, will give him sufficient information to accept or reject the part:

(1) Inspect for the appearance of the welding as to shape and size of spots.
(2) Inspect the spacing of the spotwelds.
(3) Inspect the center of spots, for it is here that cracks are more likely to occur.
(4) Inspect for flash both internal and external.
(5) Inspect for spotweld indentation.
(6) Inspect for sheet separation.
(7) Inspect for surface burning.
(8) Correlate the above with shear test data and metallographic examination conducted earlier.

The inspector is cautioned to bear in mind that the exterior appearance of a spot on the face of the sheet is not a true indication of the internal size of the spot.

There appears to be no reason why the field of spotwelding cannot be widened to include many primary aircraft structures. Quite a few applications not now considered suitable for spotwelding can be rather easily modified to make them acceptable for this process. The manufacturers of spotwelding equipment are constantly improving the electrical systems to make the machines capable of more uniform and consistent operation.

The flexibility of the equipment, the speed and economy of the operation, together with the fact that no weight is added, certainly challenges the designer and manufacturer to use this method of fabrication to the fullest.

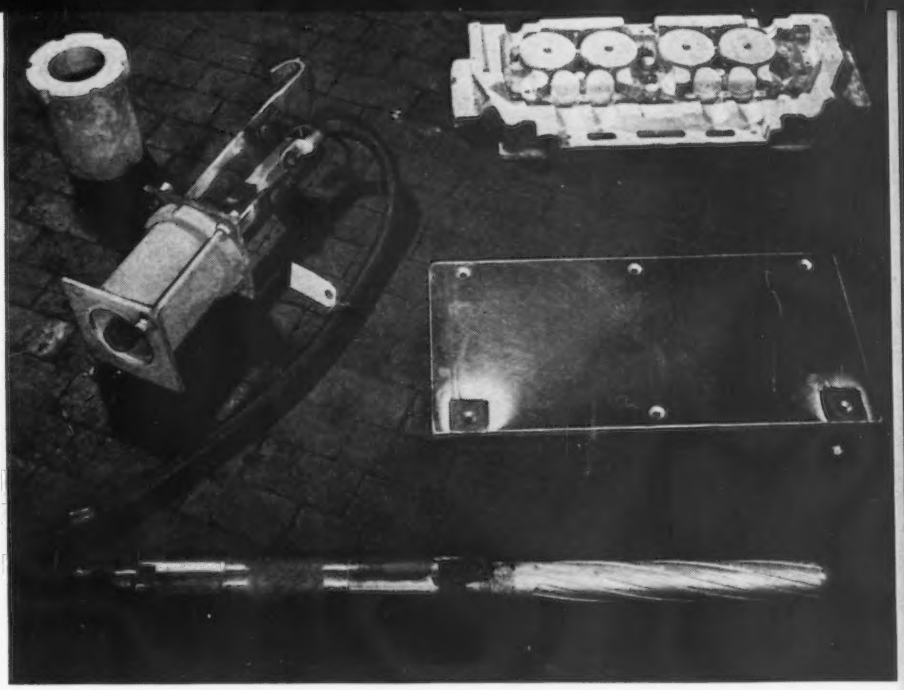

FIG. 1—A group of typical hard chrome plated parts, including (center) a blow-out plate, (top) water jacket test fixture, (bottom) Moline bar, and (left) sleeve dies. A sleeve is also shown (left) in a rack equipped with a special lead anode along the axis of the bore.

Hard Chrome Plating Finds Wide Use at Ford

By HERBERT CHASE

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Hard chrome plating is being profitably applied to many tasks at the River Rouge plant of Ford Motor Co., as this article points out. A sizable department is maintained for preparing tools and gages, resurfacing parts machined undersize and for providing surfaces to resist wear in normal service. This article describes many of these applications and gives details on handling methods, preplating and stop-off techniques and baths.

MOST modern metalworking plants are well aware of the utility of hard chromium in plating for a variety of jobs. But relatively few have put the process to use in doing so many jobs or handling them in quantities so large as is done in the River Rouge plant of the Ford Motor Co. A sizable department, including a large plating room, is kept busy there continuously handling some 50 jobs on more or less of a production scale besides doing, as occasion demands, a variety of small jobs.

Actually, this department is not classed as one doing production work but it does handle some work on a semiproduction scale besides helping production departments to make tools and gages last longer and to build up by plating numerous production parts that have been machined under size. In many cases, the flow of work is sufficient to warrant the making of special plating racks, anodes and masks used repeatedly and, in others, the saving (for example in avoiding the making of new tools or gages) warrants much labor in getting such equipment back into serviceable condition instead of replacing it. Fig. 1 illustrates a few of the many uses found for hard chrome plating at this plant.

All this becomes apparent by reference to accompanying details and illustrations. Take, for example, the plating of Johansson gage blocks. As these are manufactured by Ford not only for use in its own plants but for sale to other plants, the quantity is considerable and plating is done to minimize wear. This process justifies the use of special racks, one of which is shown loaded in fig. 2. The rack itself clamps the blocks in a holder. When in place, flat lead anode plates are adjusted so as to throw the plating on the surfaces meant to receive it. This helps to build up the deposit quickly and to reduce plating time.

Scores of other gages as well as cutting tools have to be plated either when new or after wear in service or both. Snap, plug, ring and bar gages and arbors are some of the items so plated. In some cases masking of surfaces not to be plated is done only with tape or stop-off lacquer but in others rubber covers or blocks of Lucite plastic are applied, especially for parts that are needed in considerable numbers or are often returned for replating.

Where a complicated fixture, such as that used in water block testing, has to be plated, especially in deep recesses, a complex anode has to be constructed, as in fig. 3. The anodes are made from lead and, after the parts are cut or formed to the required shape, they

ABOVE

FIG. 2—Racking Johansson gage blocks for plating in a special rack having a pair of plate-like lead anodes.

o o o

BELOW

FIG. 4—Applying lead masks and attaching a ring gear to a special rack, having a ring anode, for plating an undersize portion of the hub diameter.

have to be joined by burning, as shown in fig. 3.

A water jacket test fixture plated by the use of a complex anode assembly is shown at top right in fig. 1, which also shows a blow plate (center), a Moline bar (bottom) and sleeve dies (left) one of the latter being in the plating rack which includes a central anode. All these parts are either plated originally or for repair to resist wear in production or testing operations.

Expensive parts, such as ring gears or crankshafts, if machined under size on one or more surfaces, are chrome plated on these surfaces and then are reground to size, making them as good or better than if not machined below size initially. Under-size turbo shafts produced during the war were plated in this way and performed so well in service that it was decided to plate all such shafts as a part of regular production procedure.

In the ring gear, fig. 4, part of the hub has been ground too small. After fastening the gear in the fixture shown, the hub is built up by plating the outer diameter. While plating, teeth are covered with a disk-like lead sheath and the face is covered with a plate. Then the ring anode shown is adjusted to sur-

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LEFT

FIG. 3 — Lead burner building up a complex rack with special anodes for plating a water block test fixture.

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FIG. 5—Setup for plating undersize surfaces of crankshafts as they rest on rigid anode supports.

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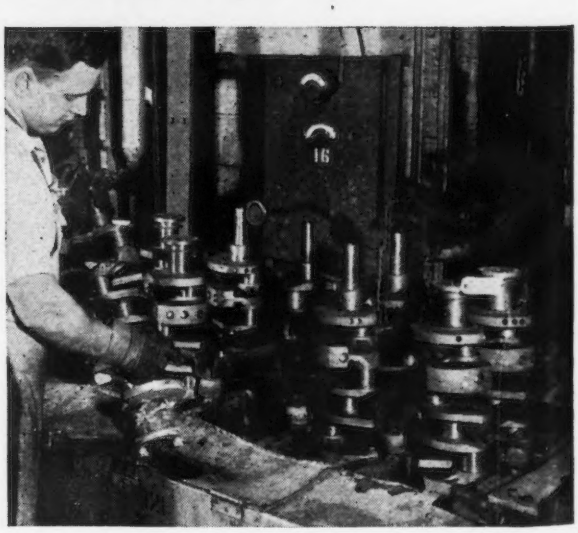


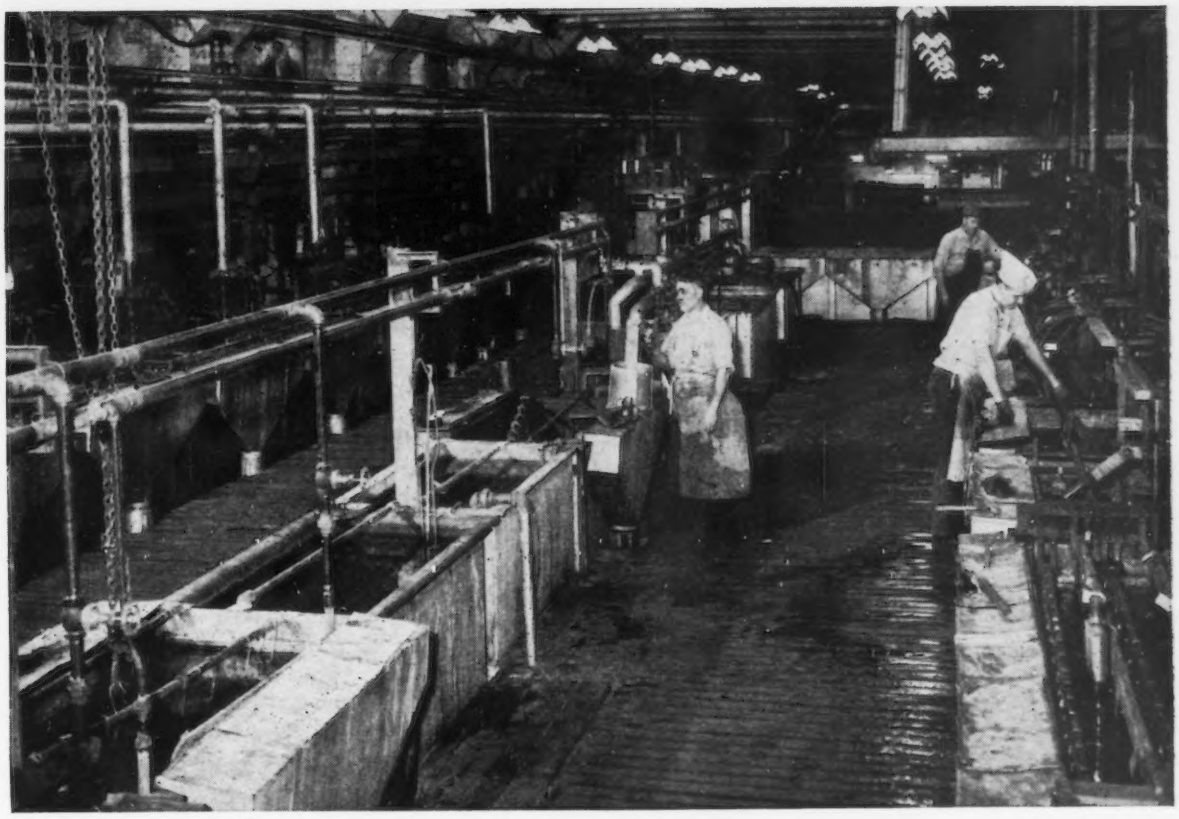


FIG. 6—One end of the Ford hard chrome plating department. Nearly all the tanks shown are for such plating and several not shown are also used for this purpose.

round the hub and the part is ready for plating. Racks already filled are seen in the background.

Crankshafts ground too small on one pin are shown being plated in fig. 5. As there are many such shafts, a tank equipped with special support anodes is provided. In such cases, only that part of the shaft that dips below the plating solution and is not to be plated has to be masked, as no plating is done on portions projecting above the electrolyte. A part of one mask can be seen on the shaft which the operator has removed for gaging. Cathode bars are so arranged that the weight of the shaft upon them provides a satisfactory contact without using a special rack.

Plating Plastic Molds

In all, some 50 different parts are handled more or less regularly through the hard chrome plating tanks. There are also many parts, such as cavities for plastic molds, for example, that may be plated initially, say to a thickness of only 0.0005 in. and may never require replating. Such plating does resist abrasive action but, after being given a high polish, it also prevents sticking and helps to give the plastic moldings a smooth and lustrous surface.

In many cases, racks are provided with heavy insulated leads of copper wire used to connect the anode, which is a part of the rack, direct to a bus on the plating panel. The rack is hung from the cathode bar but is insulated from the anode by a laminated plastic separator.

Some idea as to the volume of work handled can be gained by reference to fig. 6 which shows only one end of the hard chrome plating setup. As a rule from 0.008 to 0.012 in. of chromium are applied but each part carries a card showing how great a thickness is specified and is not removed from the tank, except for check gaging, until the required dimensions are attained.

Plating Solution

Plating is done in a standard solution containing 32 to 55 oz per gal of chromic acid and one hundredth this amount of sulphate. After racking, the work is first degreased, stop-off lacquer is applied where needed and any excess lacquer is removed where not wanted. Then the work is given a short dip in alkaline cleaner, is rinsed in cold and then in hot water.

Before plating the work is deplated, using reverse current, in the regular plating solution for 30 sec. This etches the surface and makes for a good bond of the subsequent plate, application of which starts immediately after the deplating. When the required thickness of coating has been built up, the part is rinsed in cold water and then in hot water after which it is ready to be deracked.

In general, about 0.001 in. of plate is built up per hour of plating, hence, when the work is inserted, it can be tagged to indicate the approximate time of removal. At or about this time, the part is removed and gaged and, if the required thickness of plate is not built up, sufficient added time is allowed to give the necessary extra thickness.

▼ ▼ ▼

Case Hardening Wrist

FIG. 1—Cross sectional and end view of case hardened wrist pin.

Case hardening wristpins by high frequency induction heating with a newly designed 20 kw-450 kc unit is discussed herein. Use of this method is expected to permit use of thinner walled pins formed of tubing and to give a production rate in hardening of 1000 2.75-in. long pins per hr.

MEASURED solely on a Btu basis, high frequency induction heating is relatively expensive. In many applications, however, the extra cost per Btu is more than counterbalanced by the more efficient utilization of heat resulting from the precise control of area, depth, temperature and rate of heating which is characteristic of induction heating. This precision of control, plus the fact that induction heating lends itself readily to production line methods of manufacture, makes it possible in many cases to eliminate hand operations and speed up manufacturing processes.

One field in which high frequency heating offers marked advantages is the manufacture of wrist pins or piston pins. These pins are usually made from bar stock in automatic screw machines which turn the outside to the desired diameter, bore out the center to the proper wall thickness, and cut the tube thus formed to proper pin length.

The hardening of these pins by usual methods is a slow and laborious process. Hardening must be confined to a very thin layer at the outer surface. The greater part of the wall must be tough and strong, hence it is undesirable to harden the inner surface of the pin. To obtain this combination of surface hardness and inner toughness, low carbon steel for the bar stock is usually used, then the outer surface of the pins is carburized. Since the inner surface is not to be carburized, copper plugs must be inserted in each end of each pin.

The pins are then packed in charcoal or in carburizing baskets and placed in the carburizing furnace where a case of approximately 1/32-in. in depth is produced. They remain there for 4 to 18 hr, after which they are allowed to cool. After cooling, the copper plugs are removed. This step is followed by hardening by heating and oil quenching. Because of the amount of scale left by the oil quench, the pins must be cleaned by shot blasting. They are then heated again to relieve stress, and finally ground on the outside diameter. As many as five grinder operations may be necessary to give the desired mirror-like finish.

Since the whole purpose of this rather elaborate carburizing process is to limit the depth of hardening and to confine it to the outer surface of the pin, it is evident that if the depth of heat penetration in the hardening operation could be precisely controlled, bar stock containing 45 to 50 points of carbon could be used and the carburizing process eliminated.

This alone would have been enough to justify an attempt to develop a better method of hardening, but there was also the prospect of even more far-reaching advantages. Surface carburization is not a precision process according to modern standards. Carbon penetration cannot be controlled to the thousandth of an inch, hence case thicknesses specified for wrist pins were determined as much by the limitations of the hardening process as by the actual requirements of service. The minimum case depth obtainable was approximately 30 mils, and this demanded wall thicknesses of 110 to as much as 150 mils. If thinner cases of the necessary hardness could be obtained, wall thickness could be substantially reduced. This in turn would reopen the question of using seamless metal tubing instead of bar stock, which would permit still further manufacturing economies.

Because radio frequency induction heating permits the precise control which was required, experiments in its application to wrist pin hardening were begun more than a year ago by midwestern manufacturers in collaboration with Westinghouse Electric Corp.'s high frequency laboratories in Chicago and Baltimore. It was found that the desired results could be obtained economically with a 20 kw generator at a frequency of 450 kc. It was also found that the most economical and practical method was to use progressive hardening, that is to move the pins through the work coil at a

Pins With Induction Heat

o o o

By T. E. LLOYD
Pittsburgh Regional Editor

o o o

constant speed, rather than to use a larger coil and harden the whole surface at once.

As a result of this experimental work it is now possible to take the semi-finished pins as produced by automatic screw machines or cut from metal tubing and harden them without any further preparation. Using SAE 1050 steel having suitable metallurgical structure, case depths of 0.020 to 0.040 in., and hardness in excess of 60 Rc have been obtained without difficulty. Hardness of the inner surface of the pins is readily held to 25 Rc.

A whole series of hand operations—inserting copper plugs, packing the pins in charcoal or carburizing basket, placing them in the oven and taking them out, removing the copper plugs, placing the pins in the hardening oven, removing them from the oven and putting them in the oil quench, then removing them once more—is replaced by the single operation of loading the pins into a hopper. The hopper automatically feeds and positions the pins into a brass tube, from which they pass through the work coil. As they emerge from this coil, they are quenched by a spray of water. The speed of the pins through the induction coil and the quench is controlled by motor driven rollers below the quench ring and guide.

The work coil, or heater coil, is designed to permit the pins to pass through it with approximately 1/16 in. clearance. In spite of its small size, the work coil generates about 15 kw in the surface of the pins within the coil. The pins are heated and quenched so rapidly that only a small layer near the surface of the pin is raised above the critical hardening temperature. The depth of case is controlled by the speed of the pin through the coil, the power density and the severity of the quench. Typical results of the use of a 20 kw radio frequency generator and current transformer are shown in table I.

Shot blasting is also eliminated, since the induction heating method does not leave the scale deposit which follows the oil quench. Use of water instead of oil also eliminates a possible danger spot in the plant and reduces the quenching cost.

If the pin is of the conventional thick-wall type, heating for stress relief follows. This can be done by induction heating, or by conventional methods, the choice depending on which is more economical in any particular situation. With the thin-wall pin of 70 to 100 mils total thickness with a 20 mil case as a typical specification made from extruded steel tubing, this operation is considered unnecessary. In either case grinding is still required, but not to the same extent as when the pins have been hardened by carburization.

The induction heating equipment developed for this purpose by Westinghouse consists of a 20 kw, 450 kc radio frequency generator and current transformer with suitable work handling equipment. This work handling equipment includes a hopper, pin guides, inductor coil, quench ring, speed control rollers and a small drive motor. The generator is of conventional

TABLE I

Results Using a 20 Kw, 450 Kc, Radio Frequency Generator and Current Transformer in the Heat Treating of Wrist Pins

Pin Dimensions, In.				450,000 Cycle Oscillator					
OD	Wall Thickness	Length	Material	I_p, Amp.	E_p, Kv	I_{RF}	Scanning Speed, In. per sec.	Case Depth, In.	Hardness, Rc
0.750	0.125	2¾	Drill Rod	3.7	10	167	0.93	0.021	65–66
0.750	0.078	2¾	Drill Rod	3.8	10	165	0.89	0.030	65–66
0.866	.180	2¾	SAE 1050	3.5	10	155	0.62	0.040	64
0.866	.180	2¾	SAE 1050	3.9	10	150	0.90	0.030	64
0.866	.180	2¾	SAE 1050	2.1	9.6	...	0.55	0.040	62

design taking power from a 3-phase, 60 cycle supply at 230 or 460 v, converting it into radio frequency power of about 450 kc. A full wave, 3-phase, mercury vapor rectifier using six air cooled vacuum tubes supplies plate power for the oscillator. With this is a dry type, high voltage transformer with tapped primary for operation on nominal line voltages of 230 or 460 v. The secondary of this high voltage transformer is tapped to allow operation at power levels of approximately 50, 65 and 80 pct of full power output.

The generator is a self-excited oscillator employing two vacuum tubes operating in parallel and associated radio frequency circuits designed specifically for induction heating work. In using very small inductor coils—such as that necessary to harden wrist pins which have low values of resistance and inductance—a relatively high current is needed to transfer the required power into the work and provide the high power density so necessary to surface hardening. The current transformer provides the means for increasing the current above the value obtainable directly from the oscillator.

Using equipment of the type indicated above, it should be possible to harden a minimum of 1000 pins per hr, at a cost of less than 1/10¢ per pin. This is based on a pin length of 2.75 in., with an outside diameter of not more than 0.866 in. It assumes that power will cost 1¢ a kw-hr, and allows amortization of the investment over 30,000 hr of actual production operation. Replacement of tubes is assumed at 5000 hr intervals. It has been assumed, in these calculations, that the objective is production of a pin having the same characteristics as those now produced by conventional methods. Induction heating opens up the possibility of improvement in quality. If the case hardening is to be done by induction heating, the pin can be through-hardened and drawn, then case-hardened. In this manner, the overall strength of the pin could be increased sufficiently to permit redesigning, using a thinner wall pin and thus reducing its weight.

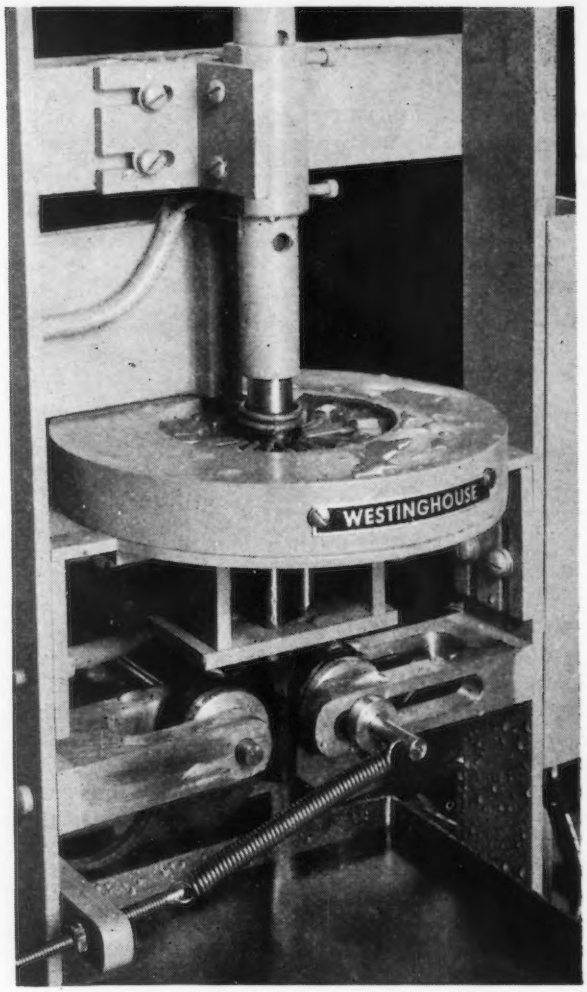
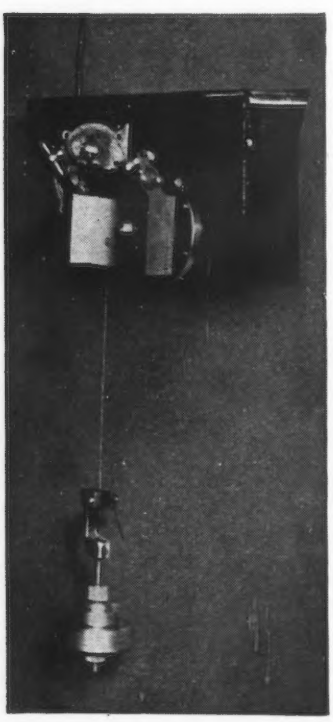


FIG. 2—Laboratory setup for case hardening wrist pins. A pin can be seen passing through two turn inductor coil and water quench while another pin is about to emerge from the speed controlling rollers below.



INSTRUMENT for pretesting tungsten wire for production of lamp and radio tube filaments.

New Tester Reveals Tungsten Wire Defects

A NEW test instrument for the accurate detection of longitudinal fissures or cracks in fine tungsten wires has been announced by the Metallurgical Laboratories of Sylvania Electric Products, Inc., Bayside, N. Y.

The instrument permits tungsten wire for lamp and radio tube filament production to be subjected to a rigid physical test which will accurately reveal flaws or seams in the wire. An outstanding feature of the apparatus is the ability to test a 3-ft long wire specimen, continuously, at one time. The fact that such a relatively long piece can be tested at one time serves to reduce the number of tests that a spool of wire would be subjected to in determining the quality of the wire.

Strictly a mechanical test apparatus, the instrument produces physical stresses in the wire as a means of revealing structural defects. The photograph at right shows the wire at the point of having already passed through the fissure tester, and, consequently, at about the end of the testing cycle.

New Short Time Aging Practice for 75S Aluminum Alloy Sheet

By J. A. NOCK, JR., and A. C. WOOLL

Assistant Chief and Metallurgist, respectively, Physical Metallurgy Div., Aluminum Research Laboratories, Aluminum Co. of America, New Kensington, Pa.

A new aging treatment for 75S aluminum sheet which permits the aging cycle to be completed during a single 8-hr shift is described in this article. In addition to a saving in time, this practice results in improved formability. Corrosion and corrosion cracking resistance are equal to results obtained by previously used aging practice.

LIKE its duralumin type predecessor, the aluminum alloy 75S is a precipitation hardening alloy. Unlike duralumin, its principal hardening constituents are 5.75 pct Zn and 2.5 pct Mg with 1.6 pct Cu and minor amounts of manganese, chromium and titanium. The 75S alloy, one of the strongest commercial aluminum alloys available, may be obtained in the form of sheet and plate, alclad sheet and plate, rod, bar, wire, and extrusions. With limitations it may also be secured in the form of forgings and tubing.

Products of 75S are always used in the fully heat treated and aged (—T) condition in order to take full advantage of the maximum strength and resistance to corrosion. This temper is preferably obtained by solution heat treating in the range of 860° to 930°F, followed by quenching in cold water, after which the material is precipitation hardened, that is artificially aged, by a second thermal treatment.

Prior to the start of the precipitation hardening treatment the as-quenched 75S products age harden spontaneously at room temperature in a manner similar to 24S products, although certain deviations will be noted. The hardening does not begin as quickly after quenching as in the case of 24S and stable properties are not obtained within a 4-day period. In fact hardening of as-quenched 75S-W is known to be incomplete after several years at room temperature. A comparison of the room-temperature aging of alclad sheet of these alloys is presented in fig. 1, along with data showing suppression of aging by refrigeration. During the first 2 hr after quenching considerable forming is possible as only slight aging occurs. Thereafter the workability decreases rapidly until only relatively simple forming operations are generally possible. The manner in which strain hardening the as-quenched material influences the mechanical properties in the artificially-aged condition will be discussed later.

Precipitation hardening of 75S sheet products is carried out at present by a two-step interrupted aging procedure which consists of heating 4 hr at 210°F, cooling to room temperature, and reheating at 315°F for 8 hr. When initially introduced, 75S products were aged 24 hr at 250°F and extrusions are still aged in this manner. The two-step treatment has produced satisfactory mechanical properties, formability and resistance to corrosion, but recently objections were raised because of the time required. The long aging cycle is a particular hardship for fabricators now operating a single 8-hr shift per day.

Aluminum Research Laboratories has continued the study of artificial aging practices for 75S sheet and is now able to recommend an aging practice requiring only 6 hr of furnace time which produces mechanical properties equivalent to those obtained in material treated by the current procedure, and which, in addition, results in a minor but useful increase in formability.

The new aging practice is also an interrupted two-step procedure employing temperatures somewhat higher than those now used and is applicable at present only to sheet and plate products. It nominally consists in heating the material for 3 hr at 250°F, cooling to about room temperature (below about 100°F), then reheating for 3 hr at 325°F.

This combination of time and temperatures is only

one of several which will produce satisfactory properties, and it was selected primarily because the equal times will eliminate a source of error. There is a reasonable factor of safety in regard to time at each temperature as it is felt that periods of 3 to 6 hr at 250°F for the initial step and 2 to 4 hr at 325°F are generally permissible.

As in most other production thermal treatments for aluminum alloys, temperature control to ±10°F is adequate. The interval at room temperature between quenching and precipitation hardening has not been found to affect the final properties, nor does the rate of cooling from the first aging step cause any noticeable change. If it is desirable, the interval at room temperature between the two steps may be extended as a matter of convenience but, in order to utilize the time saving advantage of the new practice, it is only necessary to cool to about 100°F after the first step before starting the second step of the cycle.

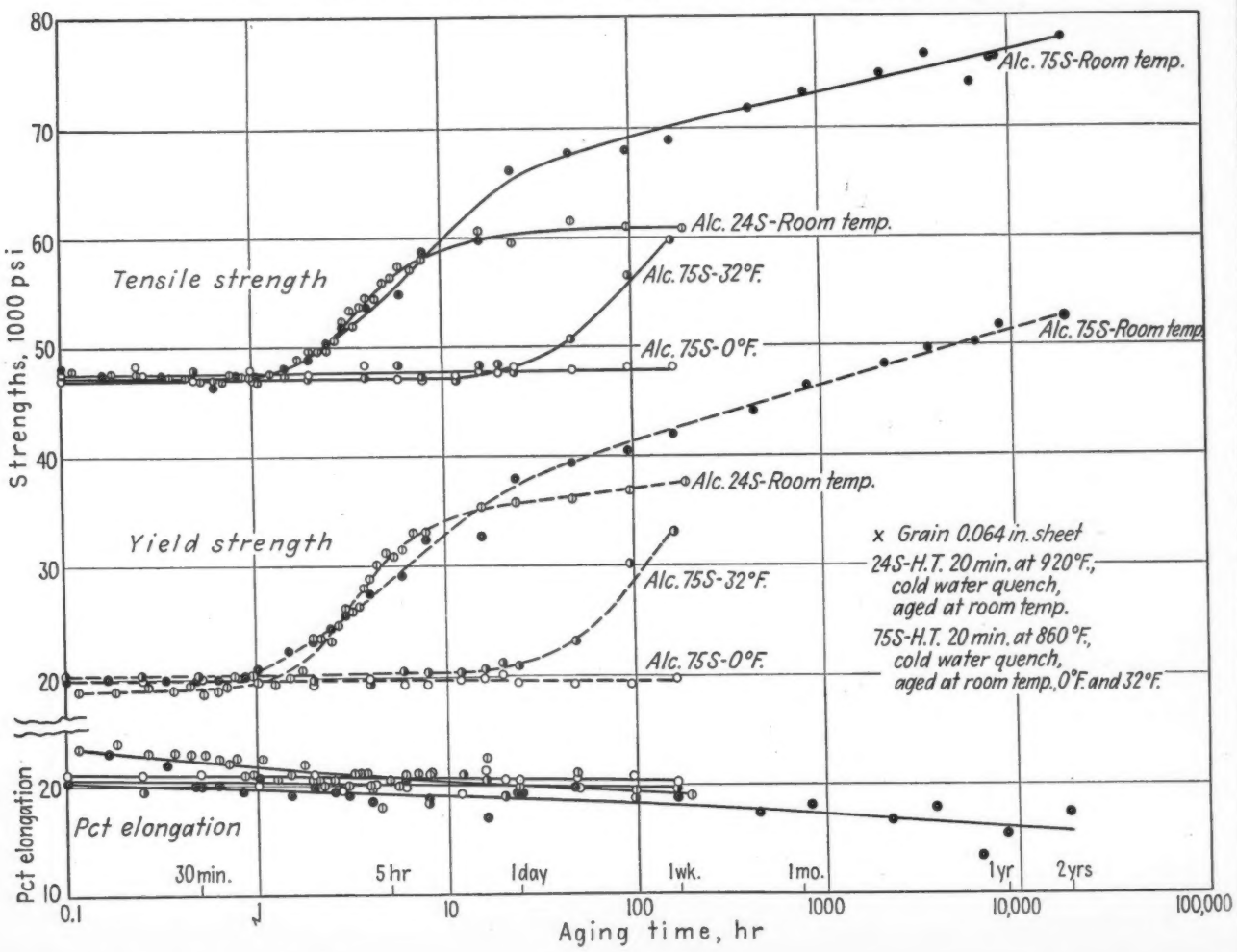
Mechanical Properties

Mechanical properties secured from sheet material so treated are at least as satisfactory as those obtained by the present two-step method. Three lots of 75S and Alclad 75S sheet, 0.064 in. thick, were fabricated by commercial methods and heat treated on a production scale. Part of each lot was then aged on a commercial scale at the plant by the present interrupted two-step aging practice, while other portions of each lot were aged by the new short time method at the Aluminum Research Laboratories. Mechanical properties of all materials were then determined and are tabulated in table I. It is readily seen that the two aging practices resulted in the development of very nearly identical tensile strength in material from a given lot. The new method developed slightly higher yield strengths on the average than the present treatment.

A small but useful improvement in formability, as indicated by bend and Erichsen cupping tests, is also shown in table I. The bend value is the minimum radius in terms of thickness (T) about which specimen may be bent through 180° without failure, and was determined on specimens cut parallel to and normal to the direction of rolling. The Erichsen cupping test is made by forcing a 10 mm diam hemisphere into a firmly secured sheet specimen until failure occurs. The value reported is the depth of the cup in millimeters at failure. In general the smaller bend radii and the greater depths of cup were obtained with material aged by the short time method, although the advantage is less evident in Alclad 75S than in 75S-T sheet. Presumably the soft alloy coating masks the small differences in these tests.

In addition to the formability tests described above, dimples for rivets of four different diameters, 3/16 in., 5/32 in., ⅛ in. and 3/32 in. with 100° countersunk heads (type AN-426) were made. Of a total of 48 dimples made in material aged by each method, the only failures which were detectable upon radiographic

FIG. 1—Comparison of effects of natural aging of Alclad 24S and Alclad 75S sheet.



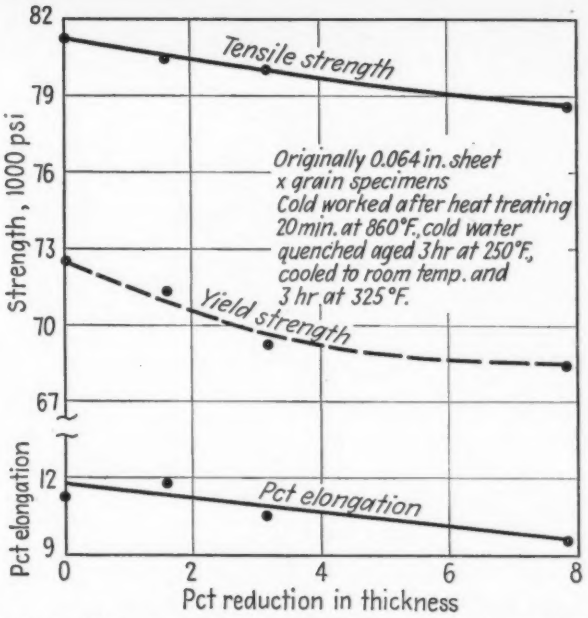


FIG. 2—Effect of cold work on 75S-W prior to aging by new short time two-step method.

examination were traced to the use of faulty tools used for the 5/32 in. diam dimples.

An indicated previously, moderate forming and straightening operations can be performed on the heat treated and quenched (-W temper) material before aging. Whenever cold working in this temper is followed by the proposed short time two-step aging treatment a lowering of the tensile and yield strengths of the finally aged product results. This decrease in tensile strength is proportional to the amount of cold work and is approximately 1000 psi for every per cent of cold work but the decrease in yield strength is somewhat greater. Fig. 2 illustrates this effect.

Cold working an amount equivalent to a reduction of about 2 pct in cross section in the -W temper is permissible since specifications were established for commercially stretched and flattened sheet, and these operations introduce about 2 pct of cold work following heat treatment and quenching. In general very severe forming operations should be performed in the annealed (-O) temper, followed by heat treating and aging. Where production reasons require that heavy forming be done on sheet in the -W temper, higher strengths can be secured when an aging practice of 24 hr at 250°F is used. This treatment eliminates the loss in properties which occurs when the two-step aging practices are employed.

The evaluation of the resistance to corrosion of a new alloy, or the effect of a new treatment on resistance to corrosion of an established alloy, is always a lengthy process. In the present instance a program to determine the effect of various atmospheric environments on material aged by the short time method has been started and will require several years to complete. In the meantime, results of accelerated corrosion tests—alternate immersion in $NaCl$-H_2O_2 solution, total immersion in boiling 6 pct salt solution, and alternate immersion in 3.5 pct salt solution—have established that the resistance to corrosion and to stress corrosion cracking of materials treated by the new practice is at least equal to that of materials aged by the present method, and may in fact be somewhat superior.

Summarizing a new aging treatment for 75S sheet products consisting of heating at 250°F for 3 hr, cooling to room temperature, and reheating at 325°F for 3 hr has been developed. The principal advantage of this practice is the great saving in time, as the aging cycle can be completed during a single 8-hr shift. Formability of sheet so aged is slightly better than that of sheet aged by the present two-step method. Resistance to corrosion and to stress corrosion cracking is at least as good as currently produced materials.

The chief disadvantage is that somewhat lower strengths result when heat-treated and quenched material is cold worked more than the equivalent of a 2 pct reduction in thickness before aging. Where necessary, these decreases in strengths may be eliminated by aging 24 hr at 250°F instead of by the interrupted two-step methods.

TABLE I

Properties of 0.064 in. Thick 75S and Alclad 75S Sheet Aged by Interrupted Two-Step Procedures

	Aging Procedure		Tensile Strength, Psi	Yield Strength, Psi	Pct Elongation, In 2 in.	Minimum Radius of Satisfactory 180° Bends		Depth of Erichsen Cup, mm
	1st Aging Step, Hr at °F	2nd Aging Step, Hr at °F				P*	N*	
Lot No. 1	3 @ 250	3 @ 325	84,500	75,050	11.3	2.5T	3T	4.07
	4 @ 210	8 @ 315	85,350	74,500	11.5	3T	4T	3.81
No. 2	3 @ 250	3 @ 325	83,750	73,300	10.8	3T	3T	3.95
	4 @ 210	8 @ 315	82,000	70,350	11.3	4T	4T	3.81
No. 3	3 @ 250	3 @ 325	83,600	74,150	11.0	2.5T	3T	4.39
	4 @ 210	8 @ 315	82,950	72,850	11.5	3T	4T	3.93
Alclad Lot No. 1	3 @ 250	3 @ 325	77,500	67,300	10.0	3T	2T	4.28
	4 @ 210	8 @ 315	78,850	68,600	11.0	2T	2.5T	4.27
No. 2	3 @ 250	3 @ 325	78,250	68,900	11.5	2T	2.5T	4.28
	4 @ 210	8 @ 315	78,750	68,550	12.0	3T	3T	3.95
No. 3	3 @ 250	3 @ 325	77,000	66,500	10.5	2.5T	3T	4.14
	4 @ 210	8 @ 315	78,500	68,550	11.5	2.5T	2.5T	4.19

P* = Axis of bend parallel to rolling direction. N* = Axis of bend normal to rolling direction.
(All materials cooled to room temperature between steps)

Steel Mill Production Scheduling

By D. I. BROWN
Chicago Regional Editor

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Vital to the maximum utilization of steel producing capacity is efficient scheduling of products and specifications. This phase of steelmaking, not too well known to steel users, is discussed in this article. The author has taken, as an example, the scheduling of material on a single bar mill and shows the movement of a backlog of various products, specifications and customers from the heat schedule right through to the shipping room.

WITH current pressure to get steel out of the mills at an all-time high, the eyes of industry are focused on the operating rate of the nation's steel producers. Very few in industry who are dependent on the products produced in an integrated steel mill appreciate fully the complex problems faced in maintaining high production rates and are seldom aware of the multitude of details that must be fitted together to keep a steel plant at top capacity.

Consumers are very familiar with the quotas of steel items they are permitted to order from the different mills. Under this system a backlog of orders of various products, specifications and customers, are entered on the steel producer's books. From that time on it is the assignment of the production planning department to meet the commitments made by the sales organization. The problem of meeting this demand on a single bar mill is schematically shown in the accompanying chart. This table is based on the experience of a large producer and may be considered typical, but not average for the entire industry.

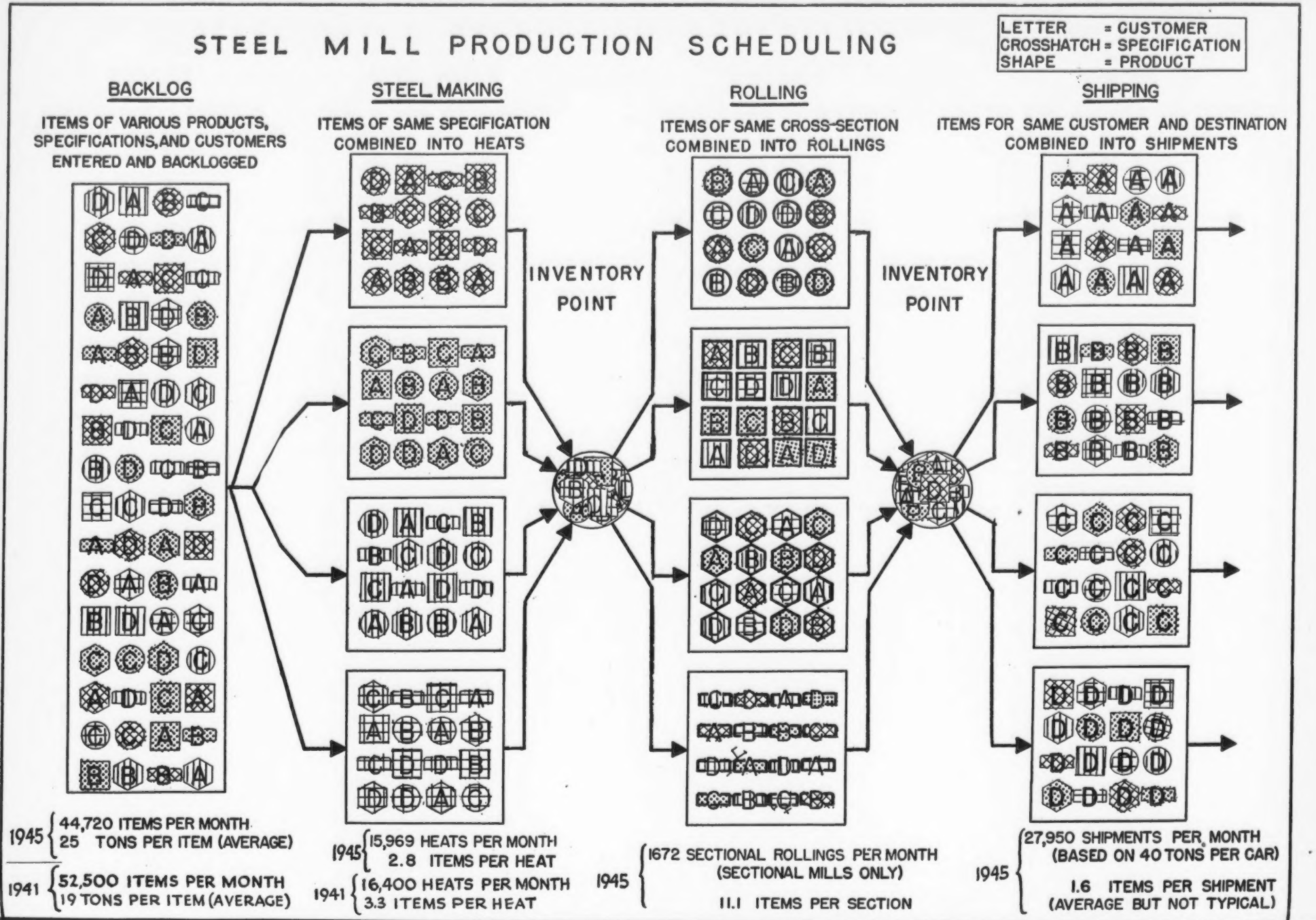
By referring to the chart the ultimate number of items shipped to any one customer can be traced. Planning, of necessity, must start with the backlog of the items ordered in the various specifications and sizes by customers. All items that appear in the backlog that are made to the same chemical specifications and melting practices are combined in heats, as shown in the chart in the column "Steel Making." Although a customer may have an order against the steel company for 100 tons, comprised of possibly four different sections, it does not necessarily follow that the steel needed to cover all items will be melted at the same time. Some of the sections in the order must be scheduled through mills on which the backlog will vary from mill to mill and from section to section. That is why in the products shipped to the eventual customer, even in the same specifications, the sections are likely to be of slightly different chemistry and from entirely different heats.

The first inventory point on the chart represents a semifinished bloom, billets or slabs as the case may be, from which the desired sections can be made on the rolling mill. It will be noted that for the year 1945 this particular plant carried on 1672 section rollings per month, with 11.1 items per section. Customer identification is not lost in processing orders through the mill even though the tonnage is lumped into sheets and section rollings. The melting and rolling departments are always informed on their order sheets to whom the finished steel items are to be shipped. From the second inventory point, which is the finished section warehouse at the end of the mill, customers' items are assembled in a different area involving section, chemistry and lengths ordered and are combined into carload shipments whenever possible. Aside from the bookkeeping standpoint, the customer identification with the product being melted or rolled is maintained for good reason. Through years of experience in supplying steel to particular customers, the mills have learned what will be and what will not be acceptable in the product to that particular customer. Certain heats and sections are often diverted from one customer to another or may be scrapped entirely, based on previous experience in serving a particular account.

There are many operations represented in steelmaking that are not shown on the chart. At the first inventory point the semifinished material must go through the conditioning yards where surface defects are removed and general quality tests are made. At the second inventory point all products must pass through the inspection department to meet standards on size, quality, straightness and other features.

After the rolled product leaves the second inventory point, and prior to being shipped, there are often other operations required by the customer to meet the order and specifications. The planning at the delivery end must be just as precise and well timed as the planning that started back with the assembly of orders. A bottleneck at the straightening machine, at the end of the bar mills or the piling up of sheets to go through a pickle tank, can be just as serious to the overall tonnage produced as a breakdown at the stripper where the molds are lifted from the ingots. Elapsed time allowed for operations carried out on steel products in the hot condition are of necessity much shorter than those permitted at the cold end. The time element of ingots in the soaking pit is by nature more critical than the length of time a bundle of bars must be held until they can be pickled. However, the total overall effect of tonnage produced by an interruption of operations at either the hot or cold end of the steel mill has a very similar effect in reducing the amount of the product made.

As there is more likelihood of spoiling the product by delays in hot working operations, with subsequent loss not only of production but of profit, this particular area of operations is very critically watched. Because of the highly complex types of operation performed in getting a finished product from a melt of molten steel, there are many unpredictable features that have to be taken into consideration. On the average, only about 30 pct of the steel poured into an ingot ends up in finished product as a result of hot cropping alone. Cobbles on the mill, material rejected for surface defects or odd sections, and a portion of semifinished product that is discarded because of poor quality, must be allowed for if the customer is to receive the proper tonnage of the proper item to the specification shown on the customer's order.


STEEL MILL PRODUCTION SCHEDULING
LETTER = CUSTOMER
CROSSHATCH = SPECIFICATION
SHAPE = PRODUCT
BACKLOG
ITEMS OF VARIOUS PRODUCTS, SPECIFICATIONS, AND CUSTOMERS ENTERED AND BACKLOGGED
STEEL MAKING
ITEMS OF SAME SPECIFICATION COMBINED INTO HEATS
INVENTORY POINT
ROLLING
ITEMS OF SAME CROSS-SECTION COMBINED INTO ROLLINGS
INVENTORY POINT
SHIPPING
ITEMS FOR SAME CUSTOMER AND DESTINATION COMBINED INTO SHIPMENTS
1945 44,720 ITEMS PER MONTH
25 TONS PER ITEM (AVERAGE)
1941 52,500 ITEMS PER MONTH
19 TONS PER ITEM (AVERAGE)
1945 15,969 HEATS PER MONTH
2.8 ITEMS PER HEAT
1941 16,400 HEATS PER MONTH
3.3 ITEMS PER HEAT
1945 1672 SECTIONAL ROLLINGS PER MONTH
(SECTIONAL MILLS ONLY)
11.1 ITEMS PER SECTION
1945 27,950 SHIPMENTS PER MONTH
(BASED ON 40 TONS PER CAR)
1.6 ITEMS PER SHIPMENT
(AVERAGE BUT NOT TYPICAL)

10,000 Trade Names

. . . The fifth section of the Trade Name Directory, compiled by The Iron Age as a ready reference for engineers and business executives, is presented herewith. Previous sections of this directory appeared in the Annual Review Issues of Jan. 2, p. 172; Jan. 9, p. 65; Jan. 16, p. 64; Jan. 23, p. 63. This directory tells what a trade name covers, its composition if a material, where or how it is used and the full address of the manufacturer or supplier.

—L—
(Continued)

Lacolite: Alloy cast iron. Lakeside Malleable Co., Racine, Wis.

Lacquo: Bolt wire. American Steel & Wire Co., Rockefeller Bldg., Cleveland 13.

Lagerbronze: Bronze for use in machine and engine parts. Eisenwerk Neubrandenburg G.m.b.H., Berlin 20, Germany.

Lamb Air-Mover: For venting contaminated confined areas. Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh.

Laminum: Laminated brass, steel, and babbitt-tipped shims; also sheets. Laminated Shim Company, Inc., Glenbrook, Conn.

Lamite: Series of Co-Cr-Mo-W cast, corrosion-resistant hard-facing electrodes. Vanadium-Alloys Steel Co., Latrobe, Pa.

Lancashire Brass: Free-cutting brass for watch and clock parts. Scovill Mfg. Co., Waterbury, Conn.

Lanz Cast Iron: High C, Si, Mn cast iron for housings, frames, gears, castings. Heinrich Lanz, A.G., Mannheim, Germany.

Lapco: Ingot aluminum and aluminum alloys. Light Alloys Products Co., Ltd., Munworth, England.

Lapix: Amarphans, powdered insulating material for top of steel ingots, to retain heat while gases escape and segregates rise closer to sinkhead. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33.

Lapointe: Broaches and broaching machines. The Lapointe Machine Tool Company, Hudson, Mass.

Larco: Ground chrome ore for maintenance of openhearth furnaces. E. J. Lavino & Co., 1528 Walnut St., Philadelphia 2.

Lascut: A 3.5 W electric alloy steel for special roll-turning tools, rifling gun barrels, boring cylinders. Thos. Firth & John Brown, Ltd., Sheffield, England.

La-Sulphite 8640: Sulphite-treated alloy cold-finished bar steel said to machine 25 pct faster than ordinary alloys and increases tool life 40 pct or more. La Salle Steel Co., P. O. Box 6800-A., Chicago 80.

Lasupar Cutting Oils: Sulphur-lard-mineral cutting oils for certain types of machining operations on steel. Gulf Oil Corp., Gulf Bldg., Pittsburgh.

Lautal: Wrought aluminum with 5 Cu for aircraft construction. Vereinigte Leichtmetall Werke, G.m.b.H., Hanover-Linden, Germany.

Lavino: Standard high-carbon ferromanganese produced by E. J. Lavino & Co., 1528 Walnut St., Philadelphia, and sold exclusively, west of Harrisburg, by Oglebay, Norton & Co., 1208 Hanna Bldg., Cleveland.

Lavino Puddler: Basic refractory brick made of high iron magnesite. E. J. Lavino & Co., 1528 Walnut St., Philadelphia 2.

Lead Fluoborate: A high-speed acid lead electroplating solution. General Chemical Co., 40 Rector St., New York 6.

Leadchek: Instrument for checking thread lead. Sheffield Corp., Box 893, Dayton 1.

Leco: Industrial laboratory combustion furnaces. Central Scientific Co., 1700 Irving Park Rd., Chicago 13.

Lectro Steel: Hot-rolled merchant and concrete reinforcing bars; grinding balls (cast white iron). Northwest Steel Rolling Mills, Inc., 4315 9th Ave., N. W., Seattle 7.

Lectrodryer: Dehumidifying equipment for the drying of air, gases and certain liquids. Pittsburgh Lectrodryer Corp., Foot of 32nd St., Pittsburgh.

Lectrogrog: Recrystalized chrome ore screened or sized for special refractory uses. E. J. Lavino & Co., 1528 Walnut St., Philadelphia 2.

Lectromelt: Electric arc-type furnaces for the melting of steel, iron, copper, monel, etc., and for the smelting of various ores as well as production of ferro-alloys, calcium carbide and similar products; 250 lb to 100-ton capacities. Pittsburgh Lectromelt Furnace Corp., Foot of 32nd St., Pittsburgh.

Lectro-Staset: Specially-sized electric-furnace refractory. Standard Lime & Stone Co., 2000 First National Bank Bldg., Baltimore 3.

Ledaloyl: Powder metallurgy products, principally bearings and parts, made from precast bearing bronze. Johnson Bronze Co., 505 S. Mill St., New Castle, Pa.

Ledbrite Brass: Free-cutting brass for screw-machine parts. Bridgeport Brass Co., Bridgeport, Conn.

Ledloy: Carbon and alloy steel with lead addition to increase machinability. Inland Steel Co., 1270-36 S. Clark St., Chicago 3.

Ledloy: Two types of steel with 0.15-0.35 Pb and varying C content for machinery parts. Inland Steel Co., Indiana Harbor, Ind.

Lee Heaters: Direct-fired, warm-air heaters for industrial buildings and high temperature applications. Lee Engineering Co., 1102 Union National Bank Bldg., Youngstown 3.

Legal: Hardenable aluminum alloy with Mg-Si-Mn for corrosion resisting light-alloy parts. Siemens-Schuckert, Ltd., London, England.

Leichtmetalle: Series of aluminum alloys for parts in airplanes, dirigibles and automobiles. Vereinigte Leichtmetall Werke, G.m.b.H., Hanover-Linden, Germany.

Leitz-Blosjo: Magnetic instrument for making carbon determinations in steel. E. Leitz, Inc., 730 Fifth Ave., New York.

Lemley: Friction clutches and friction clutch cut-off couplings. W. A. Jones Foundry & Machine Co., Chicago 24.

Lesco: Series of stainless irons and tool steels for turbine blades, cutlery, lathe and planer tools, chemical apparatus, furnace parts. Latrobe Electric Steel Co., Latrobe, Pa.

Lester: Injection molding machines for plastics. Lester-Phoenix, Inc., 2713 Church Ave., Cleveland.

Lester-Phoenix: Diecasting machines. Lester-Phoenix, Inc., 2713 Church Ave., Cleveland.

Lewellen: Variable-speed transmission, variable-speed motor pulley, and automatic variable-speed controls. Lewellen Mfg. Co., Columbus, Ind.

Lewis: Wire and rod straightening and cutting machines. Lewis Machine Co., 3441 E. 76th St., Cleveland 4.

Lewis Iron: Wrought iron for severe service in chains, hooks, staybolts, mine cars. Joseph T. Ryerson & Son, Inc., 2558 N. 16 St., Chicago.

Lewisol: Rosin-modified maleates for pale varnishes, enamels, etc. Hercules Powder Co., Wilmington, Del.

Liberty: Synthetic rubber which has proved preferable to natural rubber for gasoline hose and airplane expander tube brake. B. F. Goodrich Co., Akron, Ohio.

Lift-O-Krane: Three-in-One machine that combines a mobile crane, lift truck and a ram truck. Silent Hoist & Crane Co., 841 63rd St., Brooklyn 20.

Lightweld: Arc-welding electrodes for welding light-gage steel. Lincoln Electric Co., 12818 Coit Rd., Cleveland 1.

Lily Phosphor Bronze: Chill-cast phosphor bronze for bushings, bearings. Non-Ferrous Castings Co., Ltd., Smethwick, England.

Lima Gearshift Drives: Sizes ranging from ½ hp to 20 hp inclusive, designed for specific purpose of unit motorizing machine tools where selective speeds are required. Lima Electric Motor Co., Lima, Ohio.

Limitamp: Co-ordinated control units for high-voltage motors. General Electric Co., Schenectady, N. Y.

Limitrols: Automatic furnace shut-off. Wheelco Instruments Co., 829 W. Harrison St., Chicago 7.

Lincolnweld: Automatic shielded-arc process for welding all types of steels. Lincoln Electric Co., 12818 Coit Rd., Cleveland 1.

Linde: A-5175 alumina abrasive of uniform particle size (0.000011 in.) for polishing metals. Linde Air Products Co., 30 E. 42nd St., New York 17.

Linde: Flowmeters for argon for use with Heliarc welding process. Linde Air Products Co., 30 E. 42nd St., New York 17.

Linde: Hydrogen used in hydrogenation processes; in the production of metals from metallic oxides; and to furnish a nonoxidizing atmosphere for the heat-treatment of metals. Linde Air Products Co., 30 E. 42nd St., New York 17.

Linde: Machines for oxyacetylene squaring and edging of steel plates. Linde Air Products Co., 30 E. 42nd St., New York 17.

Linde: Nitrogen supplied in cylinders used for providing an inert atmosphere to protect materials susceptible to oxidation; also used with hydrogen for bright annealing of metals. Linde Air Products Co., 30 E. 42nd St., New York 17.

Linde: Oxygen U.S.P. supplied in cylinders for welding, cutting, forming and treating metals. Linde Air Products Co., New York 17.

Linde: Rare gases (argon, helium, krypton, neon, xenon), spectroscopically pure, for use in the manufacturing of luminous tube signs and for scientific purposes. Linde Air Products Co., 30 E. 42nd St., New York 17.

Linde: Synthetic sapphire (half-boules up to 150 carats, rods 0.065 in. to 0.155 in. diam) for wear-resistance under unusual industrial conditions. Linde Air Products Co., 30 E. 42nd St. New York 17.

Linde Corundum: Synthetic white sapphire (crystallized $A1_20_3$), for bearings and jewels for precision instruments. Linde Air Products Co., 300 Madison Ave., New York 17.

Lin-De-Surfacer: Scarfing machine for steel ingots. Linde Air Products Co., 32 E. 42nd St., New York 17.

Lindol: Non-flammable, hydraulic fluid for die casting, for wire drawing and lubricants. Celanese Plastics Corp., 180 Madison Ave., New York 16.

Lindox: Oxygen. Linde Air Products Co., 32 E. 42nd St., New York 17.

Link-Belt: Cranes; shovels; draglines, pull shovels, pile drivers, truck cranes, trailers, conveyor equipment of all types. Link-Belt Co., 220 S. Belmont Ave., Indianapolis 6.

Linoil: Foundry core oil. Werner G. Smith Co., 2191 W. 110th St., Cleveland 2.

Linoil 38: Foundry core oil drying at low temperatures, especially suited to magnesium. Werner G. Smith Co., 2191 W. 110th St., Cleveland 2.

Linpak: Grease and oil-resistant synthetic material used as sealing packing in lubricating equipment. Lincoln Engineering Co., 5701 Natural Bridge Ave., St. Louis.

Lion: Conveyor Belts. Link-Belt Co., 220 S. Belmont Ave., Indianapolis 6.

Lion Brand: Antifriction metal for most rigorous service in rolling mills, stone crushing, marine engines, electrical machinery. Blackwell's Metallurgical Works, Liverpool, England.

Lionblast: Fused aluminum-oxide abrasive grains for blasting. General Abrasive Co., Niagara Falls, N. Y.

Lionite: Fused aluminum-oxide abrasive grains for metal polishing, optical grinding, etc. General Abrasive Co., Niagara Falls, N. Y.

Liquafix: Fixer for X-ray films. Ansco, Binghamton, N. Y.

Liquid Heat: Salts for preheating, hardening and quenching. For various working ranges in the treatment of all types of steel, including high speed. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33.

Liquid Honing: Method of finishing metal surfaces with emulsion spray containing abrasive as fine as 2500 mesh. Vapor Blast Mfg. Co., 335 S. 18th St., Milwaukee.

Liquid Roof Resurfacer: For maintaining all types of roofs, flashings, and gutters. Stonhard Co., 401 N. Broad St., Philadelphia 8.

Liquidol: Developer for X-ray films. Ansco, Binghamton, N. Y.

Litecote: Arcwelding electrode for steel; corresponds to AWS E-4510. Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14.

Lithobrade: Abrasive grain used for graining lithograph plates. Norton Co., Worcester 6.

Lithoclase: Periclase ramming mixture for furnace linings. E. J. Lavino & Co., 1528 Walnut St., Philadelphia 2.

Lithoform: Phosphate coating chemical for galvanized zinc or cadmium surfaces. Bonds paint, overcoming the usual peeling of the paint. Applied with a brush or spray gun. American Chemical Paint Co., Ambler, Pa.

Lithokrome: Prepared (chrome ore base) casting mixture for monolithic furnace linings. E. J. Lavino & Co., 1528 Walnut St., Philadelphia 2.

Littite: Alloy cast iron. Little Bros. Foundry Co., 2431 Connor St., Port Huron, Mich.

Little Giant: Automatic electric bilge pump. Chicago Pump Co., 2300 Wolfram St., Chicago 18.

Li-Vac: Nickel coloring compositions. Bruce Products Corp., 5712 12th St., Detroit 8.

Lixol: Fast acting emulsion solvent cleaner for metal products. Cowles Detergent Co., 7016 Euclid Ave., Cleveland 3.

Lo Cro: 5 Cr rust-resisting steel alloys with or without 1 W or 0.5 Mo, for high temperature studs, bolts, oil refinery equipment. Crucible Steel Co. of America, Chrysler Bldg., 405 Lexington Ave., New York.

Lo Cro 46 MO: Arcwelding electrode for stainless steel; corresponds to AISI .502. Crucible Steel Co. of America, 405 Lexington Ave., New York.

Lo Flo: Silver brazing alloy. Fusion Engineering Co., 1836 Euclid Ave., Cleveland.

Load King: Hand lift truck. Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia 24.

Loaded Iron: Cast iron with Cr, P; for cylinder liners. Sheepbridge Stokes Centrifugal Castings Co., Ltd., Chesterfield, England.

Loalin: Polystyrene molding compound. Catalin Corp. of America, 3 Park Ave., New York.

Lobdell: External, cylindrical, centerless roll grinding machine. Lobdell Co., Wilmington 99, Del.

Lobdell-Nazel: Forging hammers. Lobdell Co., Wilmington 99, Del.

Lobdell-Nazel: Motor driven, air-actuated, self-contained forging hammer. Lobdell Co., Wilmington 99, Del.

Lock Seal: Spring-head roofing nail. American Steel & Wire Co., Rockefeller Bldg., Cleveland 13.

Lock-Clad: Aircord on which is swaged aluminum alloy tubing which decreases stretch and increases coefficient of expansion. John A. Roebling's Sons Co., Trenton 2, N. J.

Loded Centricast: Cast-iron alloy for centrifugal cylinder liners. Sheepbridge Stokes Centrifugal Castings Co., Ltd., Chesterfield, England.

Lo-Ex: Aluminum alloys and rough or semi-finished articles cast or forged therefrom, including pistons. Aluminum Co. of America, Oliver Bldg., Pittsburgh.

Lo-Ex Alloy: Low-thermal expansion cast aluminum alloy with Si-Ni-Mg-Cu for pistons. Birmingham Aluminum Casting Co., Ltd., Birmingham, England.

Lofero: Basic refractory brick made of periclase containing over 90 pct magnesium oxide and less than 2 pct iron oxide. E. J. Lavino & Co., 1528 Walnut St., Philadelphia 2.

Lofero Cement: Periclase (magnesite) cement for laying magnesite and chrome-magnesia brick. E. J. Lavino & Co., 1528 Walnut St., Philadelphia 2.

Loftus: Piping and valve arrangement, for liquid fired furnaces, either automatically or manually controlled to permit complete furnace reversal in 5 sec; checker brick used with regenerative furnaces. Loftus Engineering Corp., 610 Smithfield St., Pittsburgh.

Logan Forging Brass: Brass with Pb, Fe, Sn for brass forgings. Titan Metal Mfg. Co., Bellefonte, Pa.

Lohete: Heat-resistant metal for thermostats. H. Boker & Co., Inc., Duane St. & Broadway, New York.

Lohm: Copper alloy with 7 Ni, for radio rheostats. Driver-Harris Co., Harrison, N. J.

Lok-Thred: Studs which lock tightly into a national thread tapped hole. Do not require selective fits. Dardelet Threadlock Corp., 2832 E. Grand Blvd., Detroit 11.

Loktite: Self-locking, easily expanded speed nut used especially with wood bolts. Lewis Bolt & Nut Co., 504 Malcolm Ave., S.E., Minneapolis 14.

Lo-Maintenance: Electric motors and motor controls. Allis-Chalmers Mfg. Co., Milwaukee 1.

Loopohm: Resistor consisting of a resistance alloy ribbon formed in a shallow channel shape. Ward Leonard, 31 South St., Mt. Vernon, N. Y.

Loshbough - Jordan: Open - back, inclinable power-punch presses. L & J Press Corp., Elkhart, Ind.

Lott: Wire stretchers. American Steel & Wire Co., Rockefeller Bldg., Cleveland 13.

Lotus: 10 Sn, 15 Sb, 75 Pb alloy for bearings. Lumen Bearing Co., 199 Lathrop St., Buffalo 12.

Louverlux: Luminaires. Westinghouse Electric Corp., East Pittsburgh, Pa.

Low Brass: Corrosion resisting brass for clocks, flexible hose, bellows. Chase Brass & Copper Co., Inc., Waterbury, Conn.

Lowscore: Low carbon, 20 Cr stainless for heat resisting parts and equipment. Brown, Bayley's Ltd., Sheffield, England.

Low-Temperature Welding Alloys: Welding rods with special fluxes for surface alloying at low heats. Eutectic Welding Alloys Corp., 40 Worth St., New York 13.

Ltl: Motor control for mill auxiliaries, cranes, hoists, and other heavy duty applications. Cutler-Hammer, Inc., 315 N. 12th St., Milwaukee 1.

Lubaloy: Brass for contact springs, radio tube sockets. Western Cartridge Co., E. Alton, Ill.

Lube-Plus: Oil suspension lubricant. National Graphite Co., Inc., 6 Maiden Lane, New York 7.

Lubrico: Copper-lead-tin alloys with nickel for bearings and bushings. Buckeye Brass & Mfg. Co., 6402 Hawthorne Ave., Cleveland.

Lubricore: Stuffing-box packing made of resilient lubricated core compressed in a solid babbitt-metal shell and used in steam engines, pumps and compressors. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.

Lubricream: Industrial and automotive lubricants including both greases and oils. Ohio Grease Co., Loudonville, Ohio.

Lubrigun: Grease guns, both manual and air-operated. Lincoln Engineering Co., 5701 Natural Bridge Ave., St. Louis.

Lubrik: Lead-bearing bronze for bearings, bushings. Pittsburgh Brass Mfg. Co., East Pittsburgh, Pa.

Lubriplate: Specialized lubricants for machinery; also a rust preventative. Fiske Brothers Refining Co., 129 Lockwood St., Newark 5, N. J.

Lubrite: Oilless bearings. Merriman Brothers, Inc., 187 Amory St., Jamaica Plain, Boston.

Lubrite: See Parco-Lubrite.

Lucas Nifal: 25 Ni, 12 Al, 63 Fe alloy for permanent magnets. Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh.

Lucero: Nickel-copper alloys for springs, electrical resistances, bolts, valves. Driver-Harris Co., Harrison, N. J.

Lucite Powder: Blast (soft grit) cleaning powder No. HM 126. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Lukens: Carbon and alloy steel plates up to 206 in. wide; plates clad with Inconel, Monel, nickel and silver; steam platens; pressed pots; spun or pressed heads; preformed parts made from plate. Lukens Steel Co., Coatesville, Pa.

Lukenweld: Structures fabricated from welded plates and shapes; double-shell drier rolls; gear blanks. Lukenweld, Inc., Coatesville, Pa.

Lumarith: Cellulose acetate and ethyl cellulose plastic materials used in molded form with metals as cores or decorations and as lumination over metal foil, electrical insulation. Celanese Plastics Corp., 180 Madison Ave., New York 16.

Lumax: Bright nickel plating equipment. W. Canning & Co., Ltd., Great Hampton St., Birmingham 18, England.

Lumen: Series of copper alloys with 1-12 Sn and varying amounts of zinc and lead, also Fe, Mn, Al, Ni for casting machine parts, gears, valves, bearings, springs, propeller blades. Lumen Bearing Co., 199 Lathrop St., Buffalo.

Lumen Alloy: Copper alloy with 10 Sn, Ni-Pb-P for gears in severe service. Lumen Bearing Co., 199 Lathrop St., Buffalo 12.

Lumen Bronze: Zinc alloy with 10 Cu, 4 Al; for bearings, in electric motors and lathes. Lumen Bearing Co., 199 Lathrop St., Buffalo.

Luminox: Aluminum-oxide abrasive. Clover Mfg. Co., Norwalk, Conn.

Lumnite: Aluminum-Oxide abrasive. Clover Mfg. Co., Norwalk, Conn.

Lumnite: Hydraulic cement; refractory concrete and heat-resistant concrete for industrial furnaces; corrosion-resistant concrete. Atlas Lumnite Cement Co., 135 E. 42d St., New York 17.

Lunke-Rite: Exothermic compound to control piping in steel ingots. Conrad Wolff, P. O. Box 448, Irvington, N. J.

Lunz Iron: Alloy steel for glass molds. E. Lunn & Co., Glasgow, Scotland.

Lurgimetall: Lead with 2.8 barium, 0.4 calcium, 0.3 sodium, for bearing metals. Metallgesellschaft, A.G., Frankfurt, Germany.

Lusterite: High-carbon, Cr stainless for surgical and dental instruments, knives. Latrobe Electric Steel Co., Latrobe, Pa.

Luster-on: Inhibited zinc bright dip for automatic or handplating-cycles. Chemical Corp., 54 Waltham Ave., Springfield 9, Mass.

Lustrebright: Bright nickel plating process. W. C. Brate Co., 12 Market St., Albany. N. Y.

Lustrite: For cleaning fine finishes. Turco Products, Inc., Los Angeles 54.

Lyman: Barbed wire. American Steel & Wire Co., Rockefeller Bldg., Cleveland 13.

Lyncast: High Mn-Si bearing cast iron for chemical engineering equipment. Lynchburg Foundry Co., Lynchburg, Va.

Lynite: Series of aluminum alloys with Cu, Fe, Mg, Si for castings, pistons, connecting rods. Aluminum Co. of America, Gulf Bldg., Pittsburgh 19; Niagara Falls Smelting & Refining Corp., Jarvis & Elmwood Ave., Buffalo.

Lynite: Aluminum-alloy castings and forgings. Aluminum Castings Co., 6205 Carnegie Ave., Cleveland.

Lynore: 0.20 Cu, Cr, Ni, bal. Fe for structural parts. Carnegie-Illinois Steel Corp., Carnegie Bldg., Pittsburgh.

Lyonore: Copper openhearth steel for structural parts. Lyon, Conklin & Co., 2102 Race St., Baltimore.

M Alloy: Corrosion-resistant alloy for aircraft forgings. Thos. Bolton & Sons, Widnes, England.

M.C. Rolls: Chilled iron rolls for steel mills. United Engineering & Foundry Co., 1st National Bank Bldg., Pittsburgh.

M-H: Steel alloys for heavy duty rollers in sheet mills. Macintosh-Hemphill Co., Pittsburgh.

M&N: Hydraulic hobbing presses used for hobbing mold cavities, die sinking, etc. M & N Machine & Tool Works, Clifton, N. J.

Mabco: Firebrick. Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis 1.

Mac: Precision lathe grinders. The McGonegal Manufacturing Co., E. Rutherford, N. J.

Macadamite: Aluminum alloy with 23 Zn, 3 Cu, for sand castings. Niagara Falls Smelting & Refining Corp., Buffalo.

Macalloy: Abrasion resistant Ni-Cr-Mo alloy steel. Colonial Steel Div., Vanadium-Alloys Steel Co., Grant Bldg., Pittsburgh.

McCaa: Oxygen breathing apparatus; independent oxygen supply for the individual wearer up to periods of 2 hr. Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh.

McCaskey Industrial Controls: Systems for controlling production, machine loading, dispatching, tool crib operations and tools, perpetual inventory, costs, payroll, maintenance, etc. McCaskey Register Co., Industrial Div., Alliance, Ohio. McCaskey Register Co., Alliance, Ohio.

Macco: Pure Swedish iron for magnetic parts in all kinds of electrical instruments. P. F. McDonald & Co., 10 Boston House, Boston.

Macco Alloy Razor Blade: High-carbon chrome steel for razor blades. P. F. McDonald & Co., 10 Power House, Boston.

McCulloch Process: Process for applying protective film to aluminum and aluminum alloys. Aluminum Co. of America, Pittsburgh; Reynolds Metals Co., Louisville.

McGill Metal: Copper alloy with 9 Al, 2 Fe for gears, bushings, bearings. McGill Mfg. Co., 775 Oak St., Valparaiso, Ind.

McGregor: Skull breakers for breaking solidified metal in ladle bottoms. Allis Chalmers Mfg. Co., Milwaukee 1.

MacHempite: Series of wear resistant alloy steels with Ni-Cr-Mo-Mn; for jaws, rollers, gears, pinions, hammers, brake-drums. Mackintosh-Hemphill Co., 901 Bingham St., Pittsburgh.

Machinable Cast Iron: Flux-coated cast iron welding rod. Champion Rivet Co., Harvard and E. 108th St., Cleveland.

McK: Series of Mn steels for welding electrodes. McKay Co., 1005 Liberty Ave., Pittsburgh.

Mc Kay: Valves, diaphragm packless type, for compressed gas cylinders. Prest-O-Lite Co., Inc., and Linde Air Products Co., 30 E. 42nd St., New York 17.

Macosol: Water-soluble cleaner concentrate to remove grease, oil, tar, etc., at 160° to 180° F; for all metals, including aluminum and magnesium. Macdermid, Inc., 1000 Huntingdon Ave., Waterbury 88, Conn.

Mag Metal: Pt substitute. J. L. Snowber, 12 E. 41st St., New York.

Magalloy: Mg alloys for pistons, permanent-mold castings, extruded parts. Magnesium Fabricators Div., Bohn Aluminum & Brass Corp., Adrian, Mich.

Magaluma: Aluminum alloy with Mg, Mn, for light-alloy parts. Aluminium Belge, S. A., Liege, Belgium.

Magdolite: Dead-burned dolomite for open-hearth and electric furnaces. J. E. Baker Co., York, Pa.

Magic-Etch: Chemical bath treatment producing a dull-gray matt surface; for base for finishes; for blackening of metal products. Mitchell-Bradford Chemical Co., Bridgeport, Conn.

Magic-Grip: V-Belt sheaves. Allis-Chalmers Mfg. Co., Milwaukee 1.

Magna-Bond: Porcelain bushing cement. Allis-Chalmers Mfg. Co., Milwaukee 1.

Magnalaire: Luminaires, lamps, fixtures, globes. Westinghouse Electric Corp., East Pittsburgh, Pa.

Magnalium: Series of aluminum alloys with Cu, Mg, Ni, Sn, Pb for light-alloy castings. Westinghouse Electric Corp., East Pittsburgh, Pa.

Magnamix: Magnesite ramming mixture for basic-electric steel furnace bottoms. Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh 22.

Magnefer: Dead-burned dolomite refractory for openhearth furnace bottom and slag line maintenance. Basic Refractories, Inc., 845 Hanna Bldg., Cleveland 15.

Magnel: Special iron alloy for electrical and electro magnetic instruments, magnet cores. National Malleable & Steel Casting Co., Quincy & Reservoir Aves., Cleveland.

Magnetic Grip-Shields: Transparent plastic machine guards held and positioned on all machine tools by permanent magnets. Dilley Mfg. Co., 10111 Euclid Ave., Cleveland 6.

Magnex: Chemically bonded magnesite refractory brick. Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh.

Magno: Low-carbon iron for high-permeability magnet cores. National Malleable & Steel Castings Co., 10600 Quincy St., Cleveland.

Magnolia Bearing Bronze: Bronze with 10 Sn and 10 Pb for bearings and bushings to operate under high speed and pressure. Magnolia Metal Co., 18 W. Jersey St., Elizabeth 4. N. J.

Magno-Nickel: A 2-6 Mn bearing nickel for tools. International Nickel Co., 67 Wall St., New York.

Magnowin: Mg alloy. Wintershall, A. G., Heringer, Germany.

Magnuminium: Series of magnesium-base alloys for structural parts, etc. Magnesium Castings & Products Ltd., Slough, England.

Main Line: Upright rotary railroad switch stands for service in high-speed tracks. Bethlehem Steel Co., Bethlehem.

Major Kwik: Penetrating oil for loosening rusted nuts and bolts. G. V. Pine, 39 N. Reading Ave., Boyertown, Pa.

• In order to assure the accuracy and completeness of this directory, manufacturers and suppliers serving the metalworking industry are requested to check the trade names appearing in this and succeeding issues and to advise THE IRON AGE of any omissions or errors. These changes will be incorporated in the first reprint made for general distribution. Communications should be addressed to THE IRON AGE, 100 E. 42nd St., New York 17. Attention Trade Name Directory.

Makalot: Phenol-formaldehyde molding compounds; general purpose, chemically resistant, electrical, heat resistant, high impact. Interlake Chemical Corp., Union Commerce Bldg., Cleveland 14.

Malco: Railway car couplers. National Malleable & Steel Castings Co., Cleveland 6.

Malcomizing: Method of case hardening all types of stainless steels without impairing the corrosive resistance properties, and imparting extreme wear resistance, particularly at elevating temperatures. Chapman Valve Mfg. Co., 203 Hampshire St., Indian Orchard, Mass.

Malcolmizing: Uses chromium in hardenable grades of stainless steel to produce 0.007 to 0.018-in. case of 1100 Brinell. Stainless Surface Hardening Co., 255 Bent St., Cambridge 41, Mass.

Malldrill: Portable electric drills in capacities up to ½ in. Mall Tool Co., 7740 S. Chicago Ave., Chicago 19.

Mallflex: Portable (¾ hp) electric motors for flexible-shaft equipment. Mall Tool Co., 7740 S. Chicago Ave., Chicago 19.

Mallix: Heat and abrasion resistant alloy for grate bars, elevator buckets. National Malleable & Steel Castings Co., 10600 Quincy St., Cleveland.

Mallory: Chrome-copper alloy for welding steel, spot-welding tips. P. R. Mallory Co., Inc., 3025 E. Washington Ave., Indianapolis.

Mallory 1000: A high-strength alloy of high density and specific gravity. P. R. Mallory & Co., Mallory Bldg., Indianapolis.

Mallsaw: Portable saws in capacities up to 4½ in. Mall Tool Co., 7740 S. Chicago Ave., Chicago 19.

Man-Au-Trol: A device applied to vertical turret lathes for controlling functions automatically or manually at the will of the operator. Bullard Co., Bridgeport 2, Conn.

Manelec: Si-Fe alloy for electrical equipment, motors. Empire Sheet and Tin Plate Co., Mansfield, Ohio.

Mangal: Aluminum alloy with 1.5 Mn for corrosion-resistant parts. Vereinigte Leichtmetall Werke, G.m.b.H., Hannover-Linden, Germany.

Manganal: Abrasion resistant 12 Mn, 3 Ni alloy steel for welding rods, and resurfacing high manganese steel parts. Stulz Sickles Co., Newark, N. J.

Manganal: An 11 to 13.5 Mn, 3.5 pct Ni, austenitic, non-magnetic, abrasion-resisting, weldable steel plate with tensile strength up to 150,000 psi. Used with castings for composite welded structures, etc. Jos. T. Ryerson & Son, Inc., Box 8002 A, Chicago 80.

Manganend: Welding electrode. Arcos Corp., 1515 Locust St., Philadelphia.

Manganese Antifriction: Babbitt for wide scope service. United American Metals Corp., 200 Diamond St., Brooklyn 22.

Manganese Fluoborate: A high-speed acid manganese electroplating solution. General Chemical Co., 40 Rector St., New York 6.

Manganese Sulphide: Ladle addition for improving machinability of plain-carbon and alloy steels. Ohio Ferro-Alloys Corp., 104 Citizens Bldg., Canton 2, Ohio.

Manganin: Series of copper manganese-nickel alloys for electrical instruments. Driver-Harris Co., Harrison, N. J.

Mangannickel: Nickel with 1.5 to 4 Mn; for candlesticks, water meter parts. Vereinigte Deutsche Metallwerke, A. G., Altena, Germany.

Manganweld: Two types of austenitic steel used for welding electrodes, hard-facing electrodes, and as welding electrodes for manganese steel. Lincoln Electric Co., 12818 Coit Rd., Cleveland.

Mang-Arc: See Arcaloy.

Manger: Flexible couplings. Farrel-Birmingham Co., Inc., Ansonia, Conn.

Mangonic: A 3 Mn bearing nickel for spark plugs, electrodes, connections for heating elements. Henry Wiggin & Co., Ltd., Birmingham, England.

Manhattan: Hose, belting, packing, tank linings, rubber-covered rolls and abrasive wheels. Manhattan Rubber Div., 61 Willett St., Passaic, N. J.

Mannheim Gold: Copper alloys containing about 10 Zn and 7 Sn for cheap jewelry. American Smelting & Refining Co., Perth Amboy, N. J.

Manodyze: Protective and decorative magnesium-oxide-silicate coating on magnesium alloys. Hanson-Van Winkle-Munning Co., Matawan, N. J.

Mansaver: Grab, skip, hoists, truck booms and related material-handling equipment. Mansaver Engineering Co., 310 East St., New Haven, Conn.

Man-Ten: Carbon - manganese - copper high-strength steel intended primarily for weight reduction by means of greater strength in riveted or metal-arc welded structures. Carnegie-Illinois Steel Corp., Carnegie Bldg., Pittsburgh 30.

Marathon: Valve spring wire. American Steel & Wire Co., Rockefeller Bldg., Cleveland 13.

Marathon Brand: Washed and sterilized wiping rags and materials. Wiping Materials, Inc., 2000 N. Main St., St. Louis.

Markal: Paint in stick form, used for all kinds of marking, wet or dry. Brown-Wales Co., 493 C St., Boston 10.

Markana Metal: Corrosion-resistant 60-40 brass with Mn-Fe for sheets for spinning, wash basins, sinks. Vereinigte Deutsche Nickelwerke A. G., Schwerte, Germany.

Marlox: Plastic coating for metals applied by spraying, dipping, or brushing. Used for rust and corrosion protection and as coating for welds to prevent corrosion in seams and folds. Marley Chemical Co., 6539 Russell at Don, Detroit.

Marsden: One piece, cantilever-action lock nut. National Screw & Mfg. Co., 2442 E. 75th St., Cleveland 4.

Mar-Temp Oil: High flash-point hot-quenching oil, usable at temperature as high as 400° F. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33.

Mar-Temp Salt: Low-temperature salt for obtaining full benefits of Austempering, Martempering and isothermal heat treatment. Working range from 350° to 1000° F. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33.

Martemper (ing): Quenching method in molten salts for oil-hardening steels, giving little internal stress or distortion. Ingersoll Rand Co., Phillipsburg, N. J.

Martinel: Alloy steel with about 0.75 Mn and 2.75 Ni used in ship building for high-strength applications. Martinel Steel Co., Ltd., London, England.

Marvel: Metal sawing machines. Armstrong-Blum Mfg. Co., 5700 W. Bloomingdale Ave., Chicago 39.

Masq-It: Paint booth masking liquid. Turco Products, Inc., Los Angeles 54.

Mass Spectrometer: Gas analyzer. Westinghouse Electric Corp., E. Pittsburgh, Pa.

Massalloy: Cr-Ni-Mo steel for steel castings. Massillon Steel Casting Co., Massillon, Ohio.

Mass-Flo: Elevator-conveyors. Jeffrey Mfg. Co., 906-99 N. Fourth St., Columbus 16.

Massillon: Cast steel for stokeworms. Massillon Steel Casting Co., Massillon, Ohio.

Master: Wide-faced, densely filled power-driven brushing wheels for general cleaning, deburring, descaling and finishing metal parts and surfaces. Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14.

Master Metal: Intermediate "genuine" cool-running babbitt for heavy load and high speed. United American Metals Corp., 200 Diamond St., Brooklyn 22.

Masterwalls: Movable steel partitions and wall linings for industrial, commercial and institutional buildings. E. F. Hauserman Co., Cleveland 5.

Matawan AL: Alkaline cleaner (non-electrolytic) for aluminum and magnesium sheet and castings. Hanson-Van Winkle-Munning Co., 102 Church St., Matawan, N. J.

Matrix: Special alloy containing 48 bismuth, 14.5 tin, 28.5 lead and 9 antimony for dental models and die mountings. General Electric Co., Schenectady, N. Y.

Matte Transfer Film: Photographic material used for sensitizing metal plates for the photographic printing of drawings by contact or projection. Marley Chemical Co., 6539 Russel St., Detroit.

Maxcut: Low-carbon steel for machinery and case-hardened parts. Union Drawn Steel Co., Massillon, Ohio.

Max-el: Mn-Mo and Mn-Cr-Mo alloy steels for shafts, gears, pinions, worms, spindles. Crucible Steel Co. of America, Chrysler Bldg., New York.

Maxhete: Heat-resistant Cr-Ni-W iron alloy for furnace parts. Edgar Allen & Co., Sheffield, England.

Maxi: High-speed steel taps. Heat treatment for high-speed cutting tools to improve wear resistance. Greenfield Tap & Die Corp., Greenfield, Mass.

Maxilvry: Copper-bearing austenitic Cr-Ni stainless steel for fittings, cutlery, valves and chemical applications. Edgar Allen Steel Co., Inc., 743 Washington St., New York.

Maxipres: Forging hammers. Buck & Hickman, Ltd., Otterspool Way, Watford Herts, England.

Mayari: Alloy steels with about 1 Ni varying Cr, Ti, W, Mn, Si for heat corrosion or wear resistance, for automotive, oil well and machinery service. Bethlehem Steel Co., Bethlehem, Pa.

Mayari Engine Bolt Steel: Soft nickel-chromium steel for an all-purpose locomotive engine belt bar stock. Bethlehem Steel Co., Bethlehem.

Mayari Iron: Alloy pig iron with 10 Si, 1 Ni, 2 Cr, 3 Mn; for high strength or semisteel castings with good machinability. Bethlehem Steel Co., Bethlehem.

Mayari Pig Iron: Alloy iron made directly from nickel-chromium bearing ore, used in the production of quality castings. Bethlehem Steel Co., Bethlehem.

Mayari R: Low-alloy, high-strength, corrosion-resisting steel. Bethlehem Steel Co., Bethlehem.

Mayari Staybolt Steel: Tough, low-carbon nickel-steel with the high ductility, fatigue resistance, and threading properties required in boiler staybolt service. Bethlehem Steel Co., Bethlehem.

Mazak: Zinc alloy with Al-Cu-Mg for castings. National Alloys Ltd., London, England.

Mazic Anodes: Zinc anodes, mercury free, for bright plating at high speed. Sanson-Van Winkle-Munning Co., Matawan, N. J.

Mazlo: Series of Mg alloys with Al-Zn-Mn for sand or permanent-mold castings, pressure diecastings, light alloy parts. American Magnesium Corp., Midland Bldg., Cleveland.

Mazlo Am-C52S: 95.8 Mg, 3 Al, 1 Zn, 0.2 Mn alloy with high resistance to corrosion and good working characteristics for moderately-stressed airplane parts requiring good workability (sheet, extruded shapes, tubing). American Magnesium Corp., 2214 Harvard Ave., Cleveland.

MB: Drop-forged shackles, eye bolts, clevis nuts, turn buckles, etc. Merrill Bros., Maspeth, New York, N. Y.

Me Ritingots: Cu alloy for castings. Metal Reduction Corp., North Bergen, N. J.

Measuray: Gaging equipment for fast-moving material, such as steel sheets, paper, etc.; no contact. Sheffield Corp., Dayton 1.

Mechanics Rolls: Aluminum-oxide cloth rolls. Clover Mfg. Co., Norwalk, Conn.

Meco: Welding and cutting equipment. Modern Engrg. Co., Inc., 3401-17 Pine Blvd., St. Louis.

Meehanite: Group of 21 types of castings manufactured under controlled processes to provide specific engineering characteristics to meet service requirements. Four classifications: general engineering, heat resisting, wear resisting, corrosion resisting. Meehanite Metal Corp., Pershing Square Bldg., New Rochelle, N. Y.

Megavac: High vacuum pump. Central Scientific Co., 1700 Irving Park Rd., Chicago 13.

Melhi: Rosin derivative for core oils. Hercules Powder Co., Inc., Wilmington, Del.

Melloid: Corrosion-resistant malleable bronze for marine parts, hardware, condenser tubes. Bulls Metal & Melloid Co., Ltd., Glasgow, Scotland.

Meltomatic: Paste solder slightly above 400° F. Especially applicable where soldering irons are difficult to use, as in inaccessible spaces and on small parts. Wayne Chemical Products Co., 9503 Copeland Ave., Detroit 17.

Meltrite: Pig iron produced in all standard analyses in foundry, malleable, basic and bessemer grades. Pickands Mather & Co., 2000 Union Commerce Bldg., Cleveland 14.

Mercoloy: Valve alloy. Merco Nordstrom Valve Co., 400 Lexington Ave., Pittsburgh.

Mercuric Fluoborate: A high speed acid mercuric electroplating solution. General Chemical Co., 40 Rector St., New York 6.

Mesabi: Crushing rolls. Allis Chalmers Mfg. Co., Milwaukee 1.

Mesmeric: Low-alloy Mn steel for general engineering purposes. Thos. Firth & John Brown, Ltd., Sheffield, England.

Messiter: Ore bedding and reclaiming systems. Robins Conveyors, Inc., 270 Passaic Ave., Passaic, N. J.

Mesta: Hydraulic presses, barometric condensers, automatic plate valves, pickling machines, steel rolls, cooling beds, feed reels, flying shears, electrolytic cleaning lines, sheet chargers, gear drives, rolling mills. Mesta Machine Co., Box 1466, Pittsburgh 30.

Mesta Special: Cast steel for rolls. Mesta Machine Co., Pittsburgh 30.

Metadyne: Electrical control system for rolling mills, strip mills, etc. Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester 17, England.

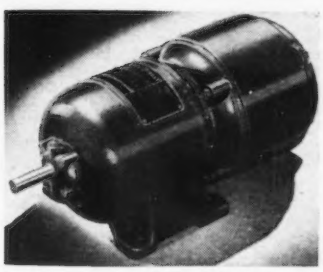
(*Continued on page* 149)

New Equipment . . .

Power Transmission

Recent developments in fluid drive and synchronous motors, air cylinders, clutch devices, magnetic relays, transformers, couplings, control switches and starters are described in this week's review together with other miscellaneous devices in this field such as oil and mechanical seals and overload indicators.

1 Development of a packaged power unit, known as Electrofluid Drive, has been announced by the *Link Belt Co.*, 307 N. Michigan Ave., Chicago. Size of the motor is based on the running horsepower, not on starting requirements, and motors are available in horsepowers up to 20. The unit is a compact, motorized hydraulic combination



consisting of a general-purpose ac induction motor flange-mounted on a sturdy housing containing a hydraulic coupling. Its output shaft may be direct-connected to the driven machine or to a speed reducer unit. It may also be connected to the driven machine through the medium of chain, gear or belt drives. The motor is said to give smooth, cushioned starting, making overload shear pins unnecessary.

AC Generators

2 Added to its line of ac generators is a new series made in both 8 and 10 poles, making it especially desirable for direct connection to 720 rpm and 900 rpm engines, the *Kato Engineering Co.*, Mankato, Minn., has announced. The alternator can be furnished either with two bearings, or single bearing to permit direct carriage of drive end of alternator on engine-driven shaft. 900 rpm generators are available with direct connected or top mounted exciter; 720 rpm generators are available only with top mounted V belt-driven exciter, all of which are of the shunt-wound type and can be furnished at either 125 or 250 v dc. Generators are available in 2 and 3 wire single phase, and 3 and 4 wire, 3 phase for voltage combinations, such as 110 to 220 v for single phase and 208-120 v 3 phase; also 3 phase, 440 v.

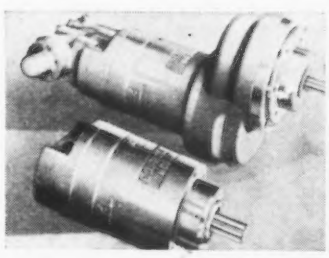
Weatherproof Motors

3 Larger outdoor weatherproof, totally enclosed motors in sizes ranging up to and above 2000 hp have been announced by the *Allis Chalmers Mfg. Co.*, Milwaukee 1. Principal change in the new line is a complete redesign of the ventilation heat-transfer system. All air passages are practically selfcleaning and pockets in which water or liquid might be trapped have been eliminated. Air passage tubes can be easily cleaned with a brush or

an air or water hose. The motors will find particular application in central station power plant service in connection with draft fans and in the chemical industry.

Fluid Motor

4 For use where rotary power with controlled variable speed is required, and where shock loads present problems for conventional motors, a fluid motor has been announced by the *Denison Engineering Co.*, Columbus 16, Ohio. This motor of axial piston design is available in a 3 hp and 5 hp capacity with or without a speed control valve, with or without a choice of geared-head units of various gear ratios, and with a selection of brackets for mounting the motor. The motor proper features an exclusive floating drive, wherein con-



stant pressure contact is maintained between the driving and driven elements without the use of mechanical linkages or connecting rods of any kind. The motor is fully self-starting; operates equally efficiently in either direction, it is said; can be instantaneously reversed, and is self lubricating.

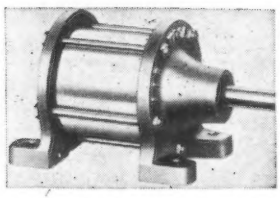
Small Synchronous Motors

5 Motors requiring an input of only 1½ w and producing a starting and synchronous running torque of 10 in-oz at 1 rpm have been announced by *Kurman Electronics Corp.*, 130 Clinton St., Broklyn. The great increase in torque has been accomplished, it is said, without a corresponding increase in iron and copper weight. No re-oiling is required as the gears are enclosed in a diecasting which supports the bearings and seals in the lubricant. The rotor shaft runs in a collar of oil rather than running against the high speed bearing ssurface. Motors can be furnished for voltage from 1 to 250 and frequencies from 25 to 120, and the

direction of rotation may be chosen either clockwise or counter clockwise. They are suited for use with industrial timing devices and controls.

Air Cylinder

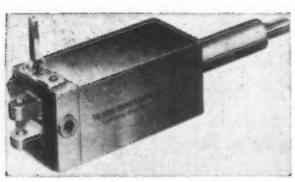
6 Designed to expedite material holding during various machining operations, for injection and ejection, and for many other operations where air power is faster and



less fatiguing than the use of clamps or other mechanical holding devices, or where it simplifies jig design, a line of air cylinders has been announced by *Air-Trol*, 2651 W. Lake St., Chicago 12. Features of these cylinders include true bore cylinders, nonrusting cylinder heads, oilless bronze ram bushings and precision assembly for smooth operation. Sizes range from 1½ in. up, and the power factor is said to be from 1.76 times the air line pressure. Foot control is available if desired.

Custom Built Air Cylinders

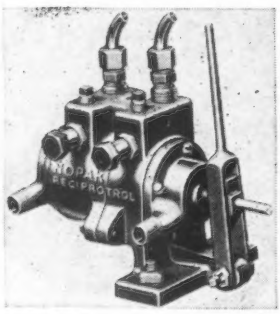
7 To overcome the objection to standard cylinders as a power mechanism, *Fenn Mfg. Co.*, Hartford, has announced its facilities for the design and building of custom built air cylinders to fit into



any machine design. Each cylinder is engineered specifically for its particular application and can be built to conform to the limitations of the design without altering the power or the available pressure. To provide accurate control of the piston velocity curve according to needs, the cylinders can be cushioned at either or both ends of the stroke. The valve can be furnished as a separate item or as an integral part of the cylinder. Three different types can be furnished: Single acting, double acting, and differential acting, and there are virtually no restrictions in design, since no standard specifications have to be adhered to.

Cylinder Control Valve

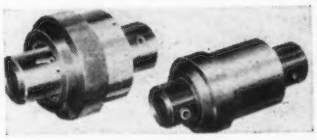
8 Recently introduced by *Galland-Henning Mfg. Co.*, the Nopak Reciprotrol valve is said to provide a combination of control features never before offered in a single 4-way valve in operating any size or make of air cylinder at line pressures from 50 to 300 psi, either air or oil hydraulic. It positively regulates stroke speed in both directions independently, and permits a choice of cycle speeds from 0 to 500 complete cycles per min. Built-in controls permit accurate regulation of the stroke length, and fractional strokes may be located precisely at any point within the full stroke



length. The control is adaptable to fully automatic, semiautomatic or manual operation, and uses its own exhaust to reverse its operating cycle. Piston travel is said to stop at precisely the same point on every stroke. It is built in ⅜-in. pipe size, and in addition to operating double-acting cylinders can also be used to operate two single-acting, spring-return cylinders.

Clutch Safety Device

9 Developed to eliminate damage to automatic machinery from overloading, a clutch with a means for overload disengagement has been announced by the *Polaroid Corp.*, Cambridge 39, Mass. It is known as the Wolff Clutch and said to be a simple solution to the problem of overloads in the transfer of torque. It is suited for installation in automobile transmissions to make the shifting of gears entirely automatic; as a device for controlling torque in power driven tools such as screw drivers and tapping machines; as a safety coupling in printing presses and in other types of automatic machinery. The device brings about complete disengagement of two connected rotary machine parts through the automatic introduction



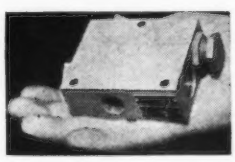
of a lubricant between the frictional surfaces the instant that one of the parts is overloaded.

Flexible Gear Drive

10 Called a Gearmatic drive, a floating gear drive has been introduced by the *McNally Pittsburg Mfg. Corp.*, Pittsburg, Kans., for their double roll crushers. It is said to be more flexible than gear trains heretofore used and allows wider adjustment of crusher roll centers. In the Gearmatic drive, the driver gear is held in position while the driven gear, which is mounted on a movable shaft, is followed by two floating pinions as it is shifted to new positions. The train operates in a bath of oil, the gear cover acting as a well. The drive is said to be especially useful where there are wide fluctuations in the sizes of crushed products required.

Cut-Out Valve

11 A hydraulic cut-out valve, featuring positive seating of the valves, few moving parts, small size and low pressure drop, and said to be outstanding for its low cost, has



been designed by *Electrol, Inc.*, Kingston, N. Y. The compact housing is only 1¼ in. deep and measures only 2¾ x 3½ in., making it adaptable to installation in small, narrow and hard-to-reach places. All four ports—pressure, system, return and bleed—are in the same plane. Cut-out pressures can be supplied from 300 up to 1500 psi and the differential pressure can be varied from 75 to 500 psi. An external adjustment for pressure setting is incorporated.

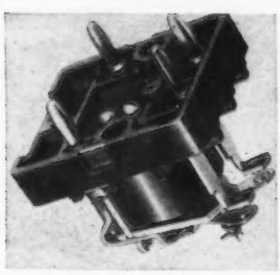
Hydraulic System

12 Production on a hydraulic device known as the Powerpak, which has been designed for use on industrial machinery and vehicles and in aircraft, has been announced by *Electrol Inc.*, 85

Grand St., Kingston, N. Y. This Powerpak combines in one compact unit a complete hydraulic system—hand pump, two separate four-way selector valves, relief valve and reservoir. Power is supplied by a hand pump, although ports for connecting a power-driven pump are provided. The Powerpak has standard parts throughout so that replacements can be readily secured. It weighs only 5 lb and, exclusive of the handle, stands 4½ in. high, with its base measuring 3½ x 4 in. The unit can supply operating pressures up to 1500 psi. The relief valve has settings up to 1750 psi.

Magnetic Relays

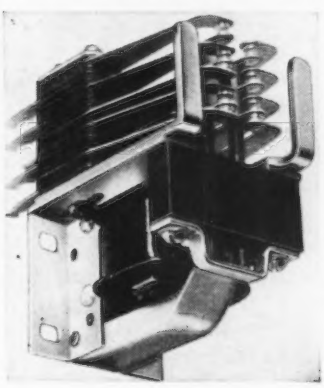
13 Bulletin 106 midget magnetic relays have been designed by *Ward Leonard Electric Co.*, Mount Vernon, N. Y., for application in industrial, electronic and special control circuits where remote or automatic operation is required.



These relays, suitable for ac or dc on standard voltages and frequencies up to 125 v, are available with single or double pole, and single or double throw silver contacts. Single break contact ratings for standard relays are 4 amp, 125 v, ac 60 cycles on noninductive loads. The relays are of the open type mounted on a molded phenolic insulating base, and where enclosures are required, Bakelite covers, steel covers, watertight boxes, etc. may be supplied. Midget magnetic relays are available for two or three-wire instrument control.

AC Relay

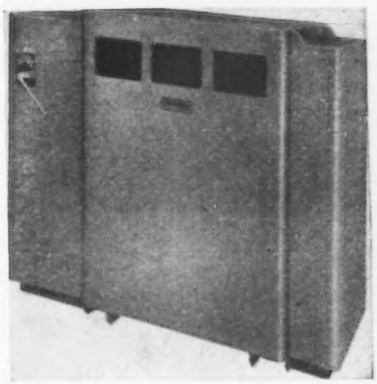
14 An ac relay has been developed by the Automatic Signal Div., *Eastern Industries, Inc.*, East Norwalk, Conn., to fill the need for a fast acting, reliable, compact relay for vehicle-actuated traffic control systems. The relay stands up in traffic control systems, it is said, under duty as high as 10,000,000 operations per year. A circuit closure of as little as 0.010 sec operates the relay cleanly and as many as 10 individual pairs of contacts



can be accommodated on each relay. Contact springs are individually encased in phenolic insulation to meet the requirement of high insulation resistance. Coils for 115 v, 60 cycles, and 12 v, 60 cycles, and pure silver contacts 5/32 in. diam, rated 5 amp, 115 v ac noninductive, and 7/32 in. diam rated 10 amp, 115 v ac noninductive are standard. Any combination of normally open, normally closed, break-make, make-before-break, or break-make-before-break, can be assembled in any relay.

Substations

15 High voltage incoming line, transformer, and low voltage feeder sections are combined in one compact assembly in the All-in-one unit substations built by *Wagner Electric Corp.*, 6400 Plymouth Ave., St. Louis 14. The illustration shows the completely enclosed, streamlined construction of the substation with air-cooled transformer for indoor installation. Noninflammable liquid-filled or oil-filled selfcooled transformers are also available. Substations are standardized in ratings 100, 150, 200 and 300 kva, 3 phase, 60 cycles. Combinations of



different types of transformers and high and low voltage equipment make them suitable for a wide range of applications.

Indoor Current Transformer

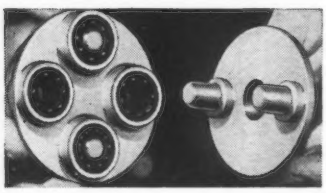
16 Announcement of a new 1200-v indoor current transformer designed for metering service on three-wire, single-phase indoor circuits has been announced by the Meter and Instrument Div., *General Electric Co.*, Schenectady 5. Designated Type JL-6, the transformer is available in primary current ratings 10//10 to 400//400 amp, and has been assigned a 30 kv full-wave rating. The transformer is of wound-primary construction and has two primary coils for connection to the three-wire circuit. It

has one secondary coil rated 5 amp. Spacing between the primary terminals is 1½ in. for all current ratings, which is adequate even for oversize cable lug connections.

Couplings

17 Designed for the low power-takeoff of fractional-horsepower drives, smaller Morflex couplings have been added to the line of power transmission equipment manufactured by the *Morse Chain Co.*, 7603 Central Ave., De-

troit. Available in two new sizes, handling 3 and 9 ft-lb torque, the couplings weigh approximately ½ and 1¼ lb, respectively. Maximum rpm is 3600 for both sizes. Stock bores range from ¼ in. on the smaller to 1 in. on the larger. The couplings use the flexible Neoprene



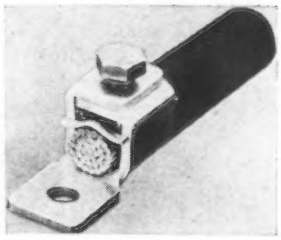
biscuit assembly, which shields machine installations from shock and permits slight angular misalinement of shafts while transferring maximum power.

Split Pillow Block

18 Universally adaptable to line shafting or machine installation, the Shafer-Improved split pillow block has been announced by *Shafer Bearing Corp.*, 1412 W. Washington St., Chicago 7. New features of design are said to permit quick and easy installation and replacement of the shaft without misalignment and with a minimum loss of production time. Dowel bolts assure positive alignment of cap, bearing and base, and two or four bolt mounting of the base is possible. An outstanding feature is the Shafer patented Z-type oil seal which retains lubrication and seals out foreign matter. Units are equipped with selfcontained Series DE22000 selfaligning bearings with two roller assemblies, a one-piece outer race and a spherical inner race.

Cable Connector

19 Adding to the regular line of solderless lugs, *Burndy Engineering Co., Inc.*, 107 Bruckner Blvd., New York 54, has made



available a large size Scrulug, the KPA34. This accommodates a range of wire and cable sizes from No. 4/0 wire to 500 Mcm cable. The connector is quickly installed by tightening the clamping bolt which forces a pressure bar upon the cable. In spite of the fact that a large range of wires can be accommodated, it is said to have the operating characteristics of the largest cable. Formed from pure copper and brazed for added mechanical strength, the conductivity, pullout value and performance are said to exceed Underwriters' Laboratory requirements.

Bearing Packing

20 Known as Clipper Seal, a new type of oil seal packing, developed for the protection of bearings has been announced by the *Johns-Manville Co.*, 22 E. 40th St., New York 16. Using no metal, the new oil seal has a high factor of heel rigidity and a soft flexibility. The product is made with a heel of resin bonded fabric giving it the rigidity essential for a press fit in the cavity and with a lip of a tough but soft flexible compound. The special lip design makes it possible to vary

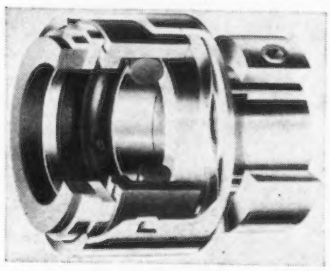
the bearing area and control the pressure of the lip against the shaft by means of a garter spring, thereby reducing shaft wear to a minimum. In service the features are said to provide a positive lubricant-retaining, dirt-excluding seal, automatic in operation, adaptable to a wide range of conditions, and highly resistant to most forms of corrosion. Clipper Seals are made in sizes for shafts from 1 5/16 to 37 in. diam, in both endless and split types.

Roller Bearing Seal

21 Announcement has been made by *Shafer Bearing Corp.*, 1412 W. Washington Blvd., Chicago 7, of a housing seal for roller bearing units. Called the Z seal, this unit is said to effectively retain lubricant and to exclude dirt. It consists of five parts. The seal element fits on an extension of the inner bearing race with minimum running clearance, providing an almost frictionless seal. The seal element is held under moderate tension, yet permitted to float radially to correct for radial displacement. Brass construction is used in these parts to prevent corrosion and to provide natural bearing material during momentary contacts with the inner bearing race. The seal is furnished as standard equipment on all Shafer roller bearing units.

Mechanical Seal

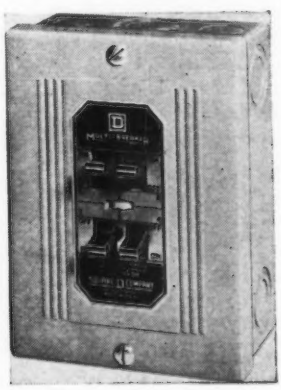
22 Sealol CB, a seal for rotating shafts has been announced by *Sealol Corp.*, 45 Willard Ave., Providence 5. The seal is designed



for original equipment or replacement and is said to make stuffing boxes obsolete. The unit is said to seal leaking shafts simply, permanently and economically and to exclude all foreign material. No skill or special tools are required to install the unit: it slides easily into position on the shaft and is locked in place with two setscrews. The only relative movement is at lapped faces and reasonable shaft run-out does not affect the performance of the seal. It is available in noncorrosive construction for shaft sizes ½ to 1 in.

Multibreaker

23 Development of a four-circuit multibreaker with both thermal and high-speed magnetic tripping action has been made by the *Switch & Panel Div.* of *Square*

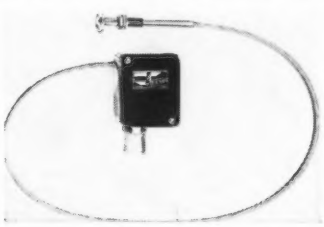


D Co., 6000 Rivard St., Detroit 11. Known as the MO-4, the new unit incorporates both the advantage of thermal tripping, which will carry starting and warming up loads of

power and lighting circuits, and the fast protection offered by magnetic tripping action when heavy overloads or short circuits occur. Designed for multibreakers for low-cost housing and as load centers in farm electrification, the MO-4 offers an assortment of branch circuit capacities of 15, 20 and 30 amp. Two single poles can be converted to a double pole for a two or three wire circuit. It is available for flush or surface mounting. A handle indicates the three positions, on, off, and tripped, with only a simple movement of the handle necessary to restore current to the circuit after the cause of the short circuit or overload has been located and corrected.

Remote Switch Control

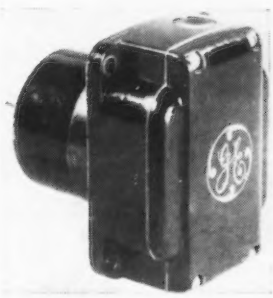
24 Combining an electrical switch and flexible control to allow for remote switch operation, a remote switch control unit, adaptable to all types of small machine tools, has been announced by *Arens Controls, Inc.*, 2253 S. Halsted St., Chicago 8. The flexible casing of



the control, mounted at a point convenient for the machine operator, can be carried to the switch box which may be located either adjacent to the motor or convenient to the wiring. The control also may be installed so that the operator with body pressure against the switch button can turn the machine off without removing his hands from the work. No special tools for installation are required. Several different models are available for installation on drill presses, belt and disk sanders, band saws, routers and many other small machine tools.

Plugging Switches

25 A line of oiltight and dustproof plugging switches for flange and surface mounting have been announced by the Control Div., *General Electric Co.*, Schenectady 5. The switches are designed to remove plugging power from a motor at the correct moment, to keep the motor from restarting in the reverse direction. The flange-



mounted form is used for built-in applications, while the surface-mounted type is for general purpose use. Contacts in the switches are of silver and can handle directly the coil current of a 150-amp contactor. The switches are provided with grease-packed ball bearings for operating the shaft and magnet assembly. Maximum continuous-rotating speed of the switches is 1800 rpm. Two sizes of springs provide for adjustment of contact operating speed over ranges of 40 to 140 rpm and 140 to 750 rpm.

Pushbuttons and Switches

26 Announcement of a line of oiltight pushbutton units, selector switches, and indicating lights especially designed for the machine tool and automotive industries has been made by the Control Div., *General Electric Co.*, Schenectady 5. Protection against entrance of oil is provided throughout the line by a diaphragm seal and a rubber

gasket. The momentary-contact pushbutton units are available in several forms: single-pole and double-pole units providing a normally open and a normally-closed circuit; three-point units providing two normally-open circuits with common connection. All contacts are double-break, and made of silver. The selector switch unit is available in single-pole double-throw, or double-pole single-throw forms. Contacts are cam operated. The indicating-light unit has single-pole mounting arrangement and is available for use on 110 to 125 v or 250 v, ac or dc.

Mercury Switch

27 Providing a fused hermetic seal between metal and ceramic, metal switch Type D-100, announced by *Mercontrol Inc.*, 278 Pearl St., New York 7, is said to intro-

TIME-SAVER CARD for your convenience in obtaining, without obligation, more information on any one or more of the new equipment items featured on this and following page.

1/30/47

THE IRON AGE, New York 17, N. Y.

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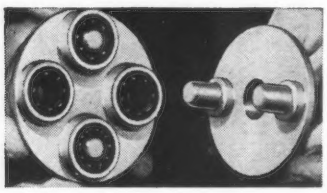


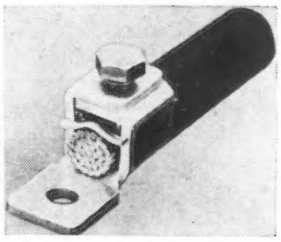
biscuit assembly, which shields machine installations from shock and permits slight angular misalinement of shafts while transferring maximum power.

Split Pillow Block

18 Universally adaptable to line shafting or machine installation, the Shafer-Improved split pillow block has been announced by *Shafer Bearing Corp.*, 1412 W. Washington St., Chicago 7. New features of design are said to permit quick and easy installation and replacement of the shaft without misalignment and with a minimum loss of production time. Dowel bolts assure positive alignment of cap, bearing and base, and two or four bolt mounting of the base is possible. An outstanding feature is the Shafer patented Z-type oil seal which retains lubrication and seals out foreign matter. Units are equipped with selfcontained Series DE22000 selfaligning bearings with two roller assemblies, a one-piece outer race and a spherical inner race.

Cable Connector

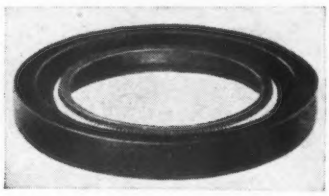
19 Adding to the regular line of solderless lugs, *Burndy Engineering Co., Inc.*, 107 Bruckner Blvd., New York 54, has made



available a large size Scrulug, the KPA34. This accommodates a range of wire and cable sizes from No. 4/0 wire to 500 Mcm cable. The connector is quickly installed by tightening the clamping bolt which forces a pressure bar upon the cable. In spite of the fact that a large range of wires can be accommodated, it is said to have the operating characteristics of the largest cable. Formed from pure copper and brazed for added mechanical strength, the conductivity, pullout value and performance are said to exceed Underwriters' Laboratory requirements.

Bearing Packing

20 Known as Clipper Seal, a new type of oil seal packing, developed for the protection of bearings has been announced by the *Johns-Manville Co.*, 22 E. 40th St., New York 16. Using no metal, the new oil seal has a high factor of heel rigidity and a soft flexibility. The product is made with a heel of resin bonded fabric giving it the rigidity essential for a press fit in the cavity and with a lip of a tough but soft flexible compound. The special lip design makes it possible to vary



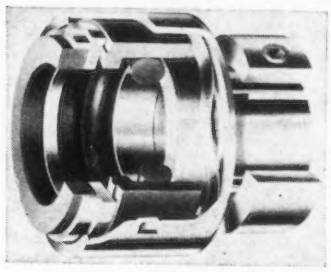
the bearing area and control the pressure of the lip against the shaft by means of a garter spring, thereby reducing shaft wear to a minimum. In service the features are said to provide a positive lubricant-retaining, dirt-excluding seal, automatic in operation, adaptable to a wide range of conditions, and highly resistant to most forms of corrosion. Clipper Seals are made in sizes for shafts from 1 5/16 to 37 in. diam, in both endless and split types.

Roller Bearing Seal

21 Announcement has been made by *Shafer Bearing Corp.*, 1412 W. Washington Blvd., Chicago 7, of a housing seal for roller bearing units. Called the Z seal, this unit is said to effectively retain lubricant and to exclude dirt. It consists of five parts. The seal element fits on an extension of the inner bearing race with minimum running clearance, providing an almost frictionless seal. The seal element is held under moderate tension, yet permitted to float radially to correct for radial displacement. Brass construction is used in these parts to prevent corrosion and to provide natural bearing material during momentary contacts with the inner bearing race. The seal is furnished as standard equipment on all Shafer roller bearing units.

Mechanical Seal

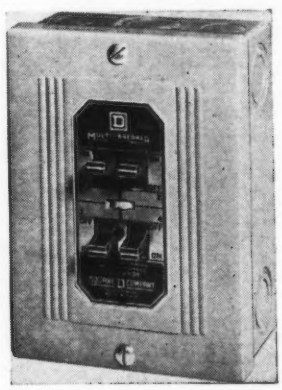
22 Sealol CB, a seal for rotating shafts has been announced by *Sealol Corp.*, 45 Willard Ave., Providence 5. The seal is designed



for original equipment or replacement and is said to make stuffing boxes obsolete. The unit is said to seal leaking shafts simply, permanently and economically and to exclude all foreign material. No skill or special tools are required to install the unit: it slides easily into position on the shaft and is locked in place with two setscrews. The only relative movement is at lapped faces and reasonable shaft run-out does not affect the performance of the seal. It is available in noncorrosive construction for shaft sizes ½ to 1 in.

Multibreaker

23 Development of a four-circuit multibreaker with both thermal and high-speed magnetic tripping action has been made by the *Switch & Panel Div.* of *Square*

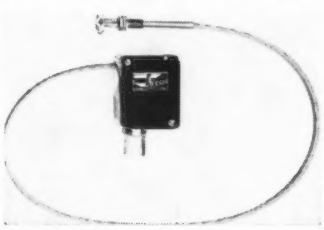


D Co., 6000 Rivard St., Detroit 11. Known as the MO-4, the new unit incorporates both the advantage of thermal tripping, which will carry starting and warming up loads of

power and lighting circuits, and the fast protection offered by magnetic tripping action when heavy overloads or short circuits occur. Designed for multibreakers for low-cost housing and as load centers in farm electrification, the MO-4 offers an assortment of branch circuit capacities of 15, 20 and 30 amp. Two single poles can be converted to a double pole for a two or three wire circuit. It is available for flush or surface mounting. A handle indicates the three positions, on, off, and tripped, with only a simple movement of the handle necessary to restore current to the circuit after the cause of the short circuit or overload has been located and corrected.

Remote Switch Control

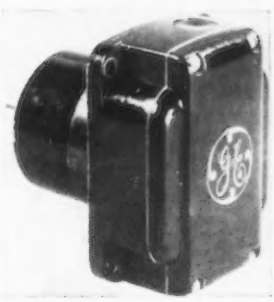
24 Combining an electrical switch and flexible control to allow for remote switch operation, a remote switch control unit, adaptable to all types of small machine tools, has been announced by *Arens Controls, Inc.*, 2253 S. Halsted St., Chicago 8. The flexible casing of



the control, mounted at a point convenient for the machine operator, can be carried to the switch box which may be located either adjacent to the motor or convenient to the wiring. The control also may be installed so that the operator with body pressure against the switch button can turn the machine off without removing his hands from the work. No special tools for installation are required. Several different models are available for installation on drill presses, belt and disk sanders, band saws, routers and many other small machine tools.

Plugging Switches

25 A line of oiltight and dustproof plugging switches for flange and surface mounting have been announced by the Control Div., *General Electric Co.*, Schenectady 5. The switches are designed to remove plugging power from a motor at the correct moment, to keep the motor from restarting in the reverse direction. The flange-



mounted form is used for built-in applications, while the surface-mounted type is for general purpose use. Contacts in the switches are of silver and can handle directly the coil current of a 150-amp contactor. The switches are provided with grease-packed ball bearings for operating the shaft and magnet assembly. Maximum continuous-rotating speed of the switches is 1800 rpm. Two sizes of springs provide for adjustment of contact operating speed over ranges of 40 to 140 rpm and 140 to 750 rpm.

Pushbuttons and Switches

26 Announcement of a line of oiltight pushbutton units, selector switches, and indicating lights especially designed for the machine tool and automotive industries has been made by the Control Div., *General Electric Co.*, Schenectady 5. Protection against entrance of oil is provided throughout the line by a diaphragm seal and a rubber

gasket. The momentary-contact pushbutton units are available in several forms: single-pole and double-pole units providing a normally open and a normally-closed circuit; three-point units providing two normally-open circuits with common connection. All contacts are double-break, and made of silver. The selector switch unit is available in single-pole double-throw, or double-pole single-throw forms. Contacts are cam operated. The indicating-light unit has single-pole mounting arrangement and is available for use on 110 to 125 v or 250 v, ac or dc.

Mercury Switch

27 Providing a fused hermetic seal between metal and ceramic, metal switch Type D-100, announced by *Mercontrol Inc.*, 278 Pearl St., New York 7, is said to intro-

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1/30/47

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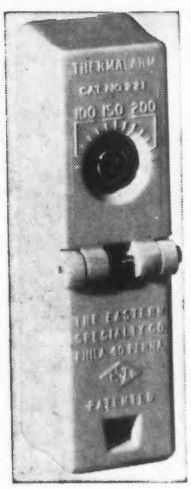
duce something new in the field of mercury switches. It is cool in operation at 100 amp continuous operation. The switch is 4 in. long x 1¼ in. in diam and has a continuous current rating of 100 amp at 110 v or 220 v dc or ac. This switch is entirely metal enclosed, providing safe and hazard free operation in atmospheres where conditions of switch sparking is a danger.

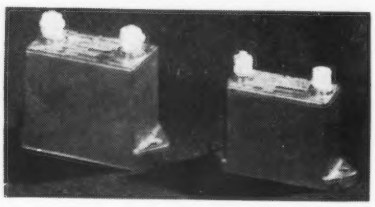
Overload Indicator

28 Called the Thermalarm, a device which checks electrical distribution system loading has been developed by the *Eastern Specialty Co.*, Philadelphia 40. The unit, which is thermally operated, can be attached to a transformer without tools and gives a visible signal, operative at a predetermined temperature, that the transformer has at some period operated at an excessively high temperature. The Thermalarm is housed in a plastic case, from the rear of which a diecast aluminum base projects, acting as a heat transmission medium. The case encloses a thermally responsive element which controls a latch releasing a flag as a signal indication. The Thermalarm is adjustable over a range from 100 to 200° F.



Capacitors

29 Lectrofilm capacitors in case styles 65 and 70 in the most popular ratings have been offered by the Transformer Div., *General Electric Co.*, Schenectady 5. These high-capacitance units are especially adaptable for radio-frequency blocking and by-pass applications where Q and temperature coefficients are not critical. Four ratings are listed in the case 65 style: 0.0001



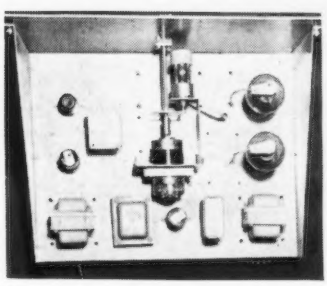
muf at 3000 v dc to 0.1 muf at 500 v dc. In the case 70 style, four ratings are also listed: 0.0001 muf at 5000 v dc to 0.1 muf at 750 v dc.

Frequency Computer

30 Problems involving frequency, inductance and capacity are quickly solved, it is said, with the Calculaide frequency computer devised by *American Hydromath Co.*, 145 West 57th St., New York 19. This computer correlates, in one setting, the natural frequency and wave length of a circuit comprising a coil and condenser with the physical dimensions of the coil and the capacity of the condenser. Induction values extending from 0.1 to 1500 micro-henrys can be determined for widely varying physical dimensions of coils, such as high-power transmitting coils or the smallest single-layer receiver coils. The computer's range covers frequencies from 400 kilocycles to 150 megacycles and wave lengths from 2 to 600 meters. It handles condensers of capacities between 3 and 1000 micro-farads. The Calculaide is 6¼ in. in diam, made of Vinylite plastic, with markings indelibly heat-sealed into the plastic itself.

Follow-Up System

31 Model 105 Servo Follow-Up System, developed by *Electronic Associates, Inc.*, 51 Brighton Ave., Long Branch, N. J., differs from the ordinary selsyn transmitter-receiver, it is said, in that the power output is greater than can be obtained with normal selsyns. Model 105 system has an output torque of 96 in-oz, with a maximum following speed of approximately 50 rpm. The high positioning accuracy of 0.027 pct permits its use in applications such as remote control,



motor positioning, gaging of liquid levels, remote presentation of measured data. The Follow-Up System serves as a torque amplifier Since control mechanism is essentially a shaft mounted in precision ball bearings without load, practically no power is required to drive the system. All controls are located on the front panel.

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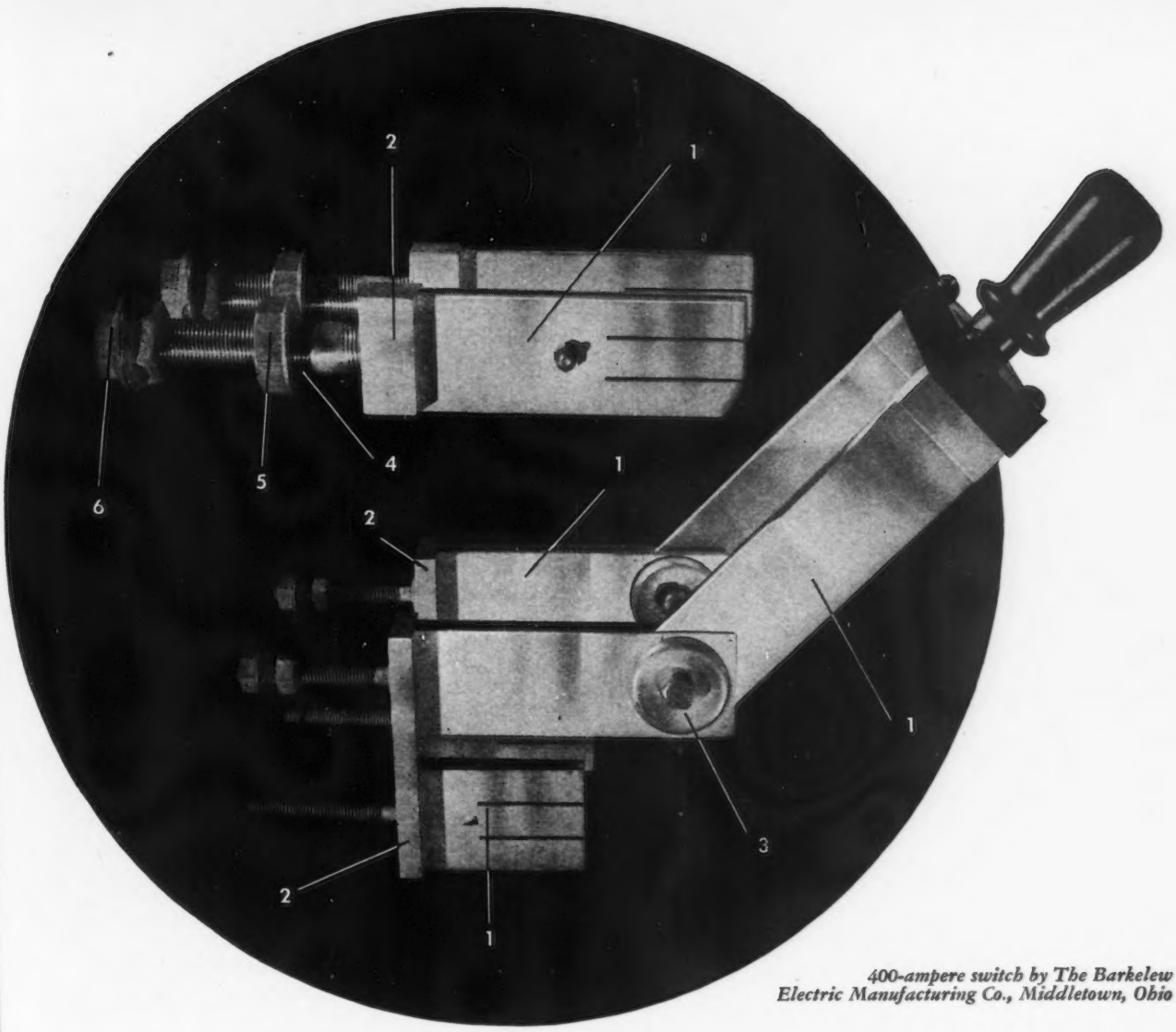

400-ampere switch by The Barkelew Electric Manufacturing Co., Middletown, Ohio

WIDE VARIETY OF REVERE METALS PERMITS EXACT SPECIFICATION TO MEET CONDITIONS OF USE

Note the number of different Revere Metals used by Barkelew in this switch, in order to assure low losses, reliability, accuracy, long life and economical manufacture.

1. *Electrolytic Copper.* For full conductivity.
2. *Free-Cutting Copper.* For quick, economical, trouble-free machining; in this case, producing sharp, clean, accurate slots and tapped holes in the copper base blocks. Free-cutting copper is rated in excess of 70% machinability of free-cutting brass, depending on type of operation.
3. *Herculoy.* Has the strength of mild steel, the corrosion-resistance of copper. The Herculoy washers in this switch assure permanence of pressure.
4. *Brass.* Washers, stamped out of sheet.
5. *Free-Cutting Brass.* Nuts, machined from free-cutting rod.
6. *Cast Electrolytic Copper.* For nuts not presenting machining problems.

Materials were very carefully chosen in designing this switch. For example, the hinge block for the high clip must have two slots milled in it to receive the clip leaves; Revere Free-Cutting Copper was selected for its superior machining characteristics. Slots in the lower hinge blocks are sawed all the way through, and here Revere Hard Drawn Electrolytic Copper is suitable.

Revere will gladly cooperate with you in working out the most advantageous application of metals to your products. Revere Metals are: Copper and Copper Alloys, Aluminum and Magnesium Alloys, Electric Welded Steel Tube.

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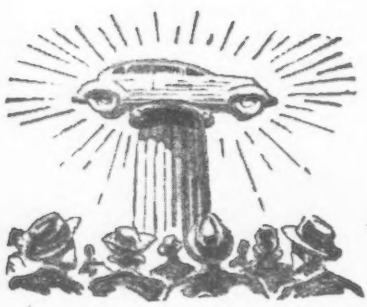
Assembly Line . . .

WALTER G. PATTON

• GM price bump kills hopes for lower selling prices for cars . . . Pontiac, Oldsmobile and Chevrolet introduce 1947 models.



DETROIT — If last week's announcement that Ford prices are reduced from $15 to $50 (THE IRON AGE, Jan. 23, 1947, p. 76) raised any hopes that automobile prices might be on the way down, this hope was quickly dashed by General Motors' announcement this week of a price increase of $18 to $193 on its Pontiac 8 and luxury models of Cadillac, Olds and Buick.

As originally headlined in the press, the GM price boost was reported to apply to all GM lines of cars and it took a heated denial by Nicholas Dreystedt, president of Chevrolet Div., to establish the fact that Chevrolet prices, for the time being at least, would be pegged at the present level. Meanwhile, scarcely anyone would deny that the Ford price announcement was probably the factor most responsible for keeping Chevrolet prices tied down. Despite the Ford reduction GM contends that Chevrolet is still the lowest priced car in its field.

GM estimates its 1947 cars will cost about $35 more on an average than its 1946 models.

Coupled with the GM announcement was C. E. Wilson's observation that he did not see any hope of a reduction in GM car prices in the near future.

It is probably only a coincidence that both Wilson and Walter Reuther, president of UAW-CIO, were skeptical concerning the Ford price announcement with Wilson characterizing the move as a "publicity stunt" and Reuther viewing the change as only a small step in the right direction.

Meanwhile, the price boost has undoubtedly made GM vulnerable from the same quarters that Ford was attempting to placate in reducing its prices. That is to say, suppliers can now justify price advances on the grounds that GM is getting more for its product. Also, labor, which is already contending that the industry will net $835 million after taxes if 1947 production hits 1941 volume, can now be expected to call its staff of researchers together and come up with a new 1947 earnings estimate that is substantially higher than the present figure of $835 million. The fact that GM insisted that only 2 pct of its volume is affected by the price jump could hardly be expected to deter the efforts of union economists from having a field day at the expense of the GM price announcement.

JUSTIFICATION for its price advance is apparently based on the fact that GM feels it is entitled to sell its products at prices competitive with other makers and to pass its excess earnings on to stockholders or reinvest them in the business. The GM reasoning seems to be that labor has upped substantially its share of the GM take; now is the time to raise the returns of GM stockholders. With labor again chafing to come in for a bigger cut, it was beginning to look last week as though some time must yet elapse before buyers of GM cars would have any substantial proportion of the corporation's earnings passed on to them in the form of lower prices for cars.

With scarcely a pause in its assembly lines, three GM divisions are now turning out 1947 models at the rate prevailing during the final weeks of 1946.

The 1947 Pontiac introduced this week has a restyled front end, a new instrument panel, several changes in body detail and there are reported to be some 27 mechanical improvements since the war. Among the engineering changes is the installation on the Pontiac Eight of vacuum metering for carburetors which automatically feed the engine a richer mixture when there is any tendency for the motor to ping. Thus the effect is said to be the same as when higher octane fuel is employed. Both the six and eight cylinder Pontiac will be so equipped in the near future, according to the present report.

At the present time, Pontiac has under way a modernization and expansion program that is expected to add 1,100,000 sq ft to its production facilities, and will eventually permit a 50 pct step-up in the current rate of production of 5000 cars per week. Included in the broad program of expansion are changes in the Pontiac foundry, motor, axle, sheet metal, plating and heat treat facilities. Much of this modernization program is already under way.

FIRST to go into operation in all probability will be the new plating plant which is reported to be the largest in the country. The plating line is more than 500 ft long and is fully automatic, providing the necessary cleaning and plating facilities for copper, nickel and chromium plating. It is reported that final adjustments prior to preliminary runs of parts are currently being made. The first production run of parts is expected to be made in a few weeks.

The new Pontiac heat treating plant will see the introduction of gas carburizing on a large scale and the installation of many facilities including salt baths, controlled atmosphere furnaces and other modern equipment. A substantial amount of the new equipment is already installed. Construction schedules call for full operation as early as May of this year. New laboratory facilities are included in the Pontiac installation.

Additions to the Pontiac foundry are also reported to be progressing favorably. Other changes planned by Pontiac call for the installation of a new sheet metal plant which will include an entirely separate line for replacement parts. Pontiac also plans to establish a separate line for the machining of replacement pistons. The capacity of this line will be 1000 units per day.

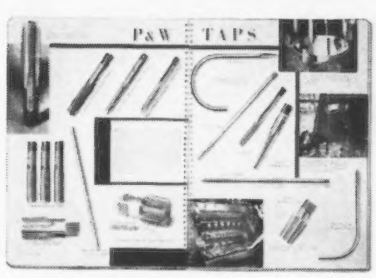
Also included in the Pontiac

with accurate smooth-cutting SMALL TOOLS

Manufacturing efficiency is the only way to offset unavoidable high material and labor costs. Smart labor and aggressive management both are beginning to realize that under present conditions their jobs will cease to exist unless production can be accomplished at a profit instead of a loss. That is why every machine operator, every foreman and superintendent should insist on cutting tools that are tough, long-lived and accurate.

Act now. Check your taps and dies. Check burs, milling cutters, reamers, drills, countersinks, punches and counterbores. These tools are at the business end of your production. Are they all cutting cleanly and precisely, keeping spoilage down, turning out the work on schedule? Are they tough enough to take it and last a long, long time?

They work well if you, like many successful manufacturers, have standardized on Pratt & Whitney Small Tools. There are 80 years of experience in small-tool design, metallurgy and accuracy behind every P&W cutting tool. Ask our experts to help you survey your requirements . . . supply P&W tools that insure smooth profit-making production.



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expansion plans are new assembly plants at Wilmington, Del., and Atlanta, which will be opened during 1947, according to present schedules.

Pontiac, which built 137,640 of its 1946 models, plans to produce more than 250,000 units in 1947 if conditions permit.

THE 1947 Oldsmobile now being displayed in dealer showrooms comprises 12 body styles, all of which offer Hydra-Matic Drive as optional equipment. According to a company announcement four out of five Oldsmobiles are now being equipped with Hydra-Matic Drive which eliminates the clutch pedal and affords automatic shifting through four forward speeds.

UP FRONT WITH OLDSMOBILE: *This closeup shows the elaborate use of chromium plating on the* 1947 *Oldsmobile. Other design changes include plastic hood-ornaments, new front fender ornament of diecast chrome and a new trunk lid ornament of chrome and plastic. Mechanically the* 1947 *Oldsmobile is about the same as* 1946 *models.*

The Oldsmobile is being offered in a "66" Series having 119 in. wheelbase and a "76" and "78" Series with 125 in. wheelbase. The "98" Series has 127 in. wheelbase and is powered with 110 hp motors. Other models are powered either with 100 hp 6-cylinder or 110 hp 8-cylinder Oldsmobile engines.

Among the design features of the 1947 Oldsmobile is the newly designed plastic hood-ornament, new front fender ornament of diecast chrome incorporating the word "Oldsmobile" on a red background, and a new trunk-lid ornament of chrome and plastic. The 1947 Oldsmobiles use hardened aluminum alloy pistons fitted with two compression and two oil control rings. Carburetion is of downdraft type with built-in automatic choke. Brakes are super-hydraulic, self-energizing type. Fisher bodies are bonderized and finished with six coats of lacquer. Quadri-coil springing is used in front and heavy coil springs at the rear. Double-action hydraulic shock absorbers are mounted front and rear.

The 1947 Chevrolet comprises 11 models in three series including the Fleetline, the DeLuxe Fleetmaster and the economy-range Stylemaster. Frontal appearance of the new models feature a new design of radiator grille, chiefly characterized by the massiveness of its horizontal bar members which extend beyond the grille opening to span the front-end sheet metal. Widely separated, larger parking lamps of rectangular form are mounted between the lower bars of the grille.

NEWLY designed decorative features include chromium-plated die-cast name plates near the rear edge of the hood, a die-cast front end emblem plate just above the grille, and a speed-lined ornamental hood at the front of the top center molding.

Body interior changes include new ultra-modern instrument panels, new ornamental treatments of the door upholstery panels and scuff pads and new colors in garnish moldings. A new steering wheel and horn button caps, and new friction-type adjustable sunshades have been added.

Chevrolet pistons are now fitted with new wide-slot oil control rings which are said to be more effective in preventing carbon deposits from building up and blocking the drain holes in the ring groove. A new type of water pump seal made of asbestos and bakelite composition is being used.

Softer live-rubber transmission supports are being used as a means of supporting the power plant in the frame and new shear-type rubber side supports are designed to absorb more torque reaction from the engine. A Durex self-lubricating powdered-metal clutch pilot bearing is used instead of the former roller bearing

To Offer Locomotives For Sale in Europe

Paris

• • • **The Office** of the Foreign Liquidation Commissioner announced recently that 956 U. S.-built locomotives, surplus to the occupation needs of the U. S. Army, are being offered for sale in Europe. The offering includes 694 coal-burning, freight-passenger models, 117 coal-burning switching engines, 101 freight- type oil burners and 14 oil-burning switchers, all of which formed part of the fleet of locomotives that operated the supply network of the U. S. Armies in Europe.

All the coal-burners, the bulk of which are stored in Germany yards in the Frankfurt and Stuttgart areas, are classified in "used, fair" condition and carry a price tag of $10,000 each. About half of them are late types carrying many innovations including improved lubricating systems equipped for pressure greasing and new electrical systems.

The 115 oil-burners, which are currently in service on French lines, have not been fully classified and will be sold at prices in line with their conditions. All prices are less than 25 pct of original cost to the U. S.

Washington . . . L. W. MOFFETT

• Government muddled over disposal of pipelines . . . Law requires quick action yet Congress now asks delay . . . FTC steel study centers on supply.

WASHINGTON—One of the sorest spots in disposal of war surpluses continues to be the big and big little inch pipelines. Robert M. Littlejohn, WAA Administrator, wants to dispose of the $147 million project at once as important to his program for getting Uncle Sam out of the secondhand business as rapidly as possible. Having rejected all bids submitted at the first offering of the pipelines as not representing a fair return, the WAA in late December put the facilities on the block for the second time. But new obstacles confront the agency.

Paradoxically, the Congress which—through enactment, amendment and revision of the Surplus Property Act — has demanded prompt liquidation of war surpluses, has found itself in the position of seeking to delay disposal of a surplus facility which is estimated to be depreciating at the rate of $12,000 a day. There has been a determined effort by some members to force through legislation which would have the effect of calling off sale of the property indefinitely.

On Dec. 27, 1946, WAA for the second time offered the pipelines for sale; promptly on the convening of Congress, WAA submitted a report which advised of this action and recommended speedy disposal of the property. Unless Congress acts within 30 days to set aside the proposed action, authority is automatically granted for WAA to proceed according to its recommendations.

Although less than 5 years old, this is another incident in the colorful history of the pipelines. Construction of the "big inch" began in August 1942 and was completed one year later at a cost of $78.5 million; work on the "big little inch" which cost $67.5 million started in April 1943 and the first oil arrived in New Jersey the following March. During their wartime operations, the two lines transported a combined total of about 375 million bbl of petroleum products from southwest oilfields to refineries in the New York-Philadelphia area. The lines were closed down shortly after the end of the war.

IN RESPONSE to an inquiry by Congress, the Army-Navy Petroleum Board promptly recommended sale or lease to private interests, either type of contract to contain a recapture clause.

Said the Board, in part: "Although the pipelines . . . will not be needed in peacetime for military purposes, they would be vitally necessary in case of another emergency. Maintenance by the government in an inoperative status would be prohibitively expensive . . . It is the opinion of the Board that various pipelines now owned by the U. S. Government should be disposed of to private industry and that there should be a clause in the disposal agreement which will permit recapture."

WAA received a preliminary declaration of the pipelines in April 1946, but formal declaration was not made by RFC until July 1, 1946. In the meantime, WAA advertised through two-score publications inviting bids on the properties, either for sale or lease. A total of 16 bids were received which were opened on July 31; the five bids offering the highest cash return ranged from $66 million to $85 million.

A special advisory group consisting of representatives from the Army-Navy Munitions Board, the Army-Navy Petroleum Board, the Federal Power Commission, the Depts. of the Interior and Commerce, the Interstate Commerce Commission, and the Senate Surplus Property subcommittee, then reviewed the several bids but refrained from making any recommendations. However, on Nov. 19, the WAA rejected all bids on the grounds that a fair return to the government had not been offered. Its appraisal division had established a fair valuation at $113.7 million.

A MAJOR portion of the controversy over the disposal has been concerned with whether the pipelines should be used for oil or natural gas. In a report to Congress on Jan. 6, 1946, W. Stuart Symington, then the disposal chief, expressed the contention that having been originally built and used for the transmission of oil, it logically followed that the pipelines should "have more value in this service than for any other purpose." He admitted, however, that conversion to transmission of natural gas would be "economically feasible and possible from an engineering standpoint." He added that if used for gas, some of the related facilities would be useless to the user.

However, there has been evidenced a coolness of the petroleum industry toward the project for oil-carrying; it has been held that only the bigger companies are financially able to shoulder the responsibility. Also it is feared that acquisition by these might tend to injure the smaller companies by giving the pipeline operator an undue advantage. This stand is further evidenced by the fact that of the top five bids on the property in July, only one was submitted by an operator desiring to move petroleum products.

Opposition to use of the lines for transportation of petroleum was also expressed by the Interior Dept. When informed by Mr. Littlejohn that he intended to ask new bids, Interior Secretary Krug stated that the Department knew of "no conservation end which

would be furthered by use of the lines for the movement of either crude oil or its products nor of any other compelling reason for such use."

On the other hand, he told Mr. Littlejohn, it was believed that a practical conservation measure could be accomplished by disposing of the lines for transmission of natural gas. The subsequent coal strike led to the temporary leasing of the lines for such a purpose. This contract expires Apr. 30.

ON CAPITOL Hill, the Senate Armed Services Committee read the WAA report and voted promptly to pigeonhole legislation which would stop or delay the impending sale of the pipelines. Legislation asking a delay of 90 days had been introduced by Senators Revercomb (R-W. Va.) and O'Mahoney (D-Wyo). Senator Kilgore (D-W. Va.) cast the only vote in opposition to tabling such legislation.

On the other side of the Capitol, however, efforts continued to block the sale. A resolution introduced by Rep. Francis E. Walter (D-Pa.) would prohibit WAA disposal of the pipelines until 6 months after the Federal Power Commission renders a report on its study of the natural gas problem. The FPC says it will require up to 6 months to complete its work; in effect, should this resolution be approved by the House Interstate and Foreign Commerce Committee and then pass both houses, disposal of the pipelines would thus be further delayed for at least another year.

Basis of Mr. Walter's legislative proposal is the belief that conversion of the pipelines to transmission of gas would create serious unemployment for the railroads as well as the anthracite mines. On questioning, Mr. Littlejohn said he estimated that if the pipelines were run at full capacity, they could supply natural gas in the equivalent of 6,000,000 tons of coal a year.

Unless legislative action is taken before Feb. 3, the authority is automatically bestowed upon Mr. Littlejohn to proceed with his disposal plans; it is presumed that he would. Should the restrictive resolutions be passed by Congress, the only alternative would be for WAA to try to extend the present gas transmission lease.

In the study it is making of the steel industry, the Federal Trade Commission is interested generally in the supply picture. This is what THE IRON AGE was told by William H. England, head of the Commission's Economic Division, who is in charge of the investigation. So-called lag of production, complaints of inability to get steel and of lack of capacity will be studied. Letters are being sent out to steel producers raising these points and asking what courses should be followed to overcome difficulties.

At the Commission, it was clearly recognized that so-called lag in production and consequent inability to meet demands are due chiefly, if not entirely, to the steel, coal and railroad strikes. The industry itself insists that had it not been for strikes it would have been able to supply demand with little or no delay in deliveries.

The Commission, which under its budget is required to make a report to Congress on or before the end of the current fiscal year, June 30, will present only facts, it was stated, and make no recommendations. It said that it has conferred with the Metals and Machinery Division of the Dept. of Commerce which also is making a survey of the steel industry, so as to avoid duplication of work. It was specifically pointed out that the FTC, unlike the Metals and Machinery Division, is not studying the basing point system.

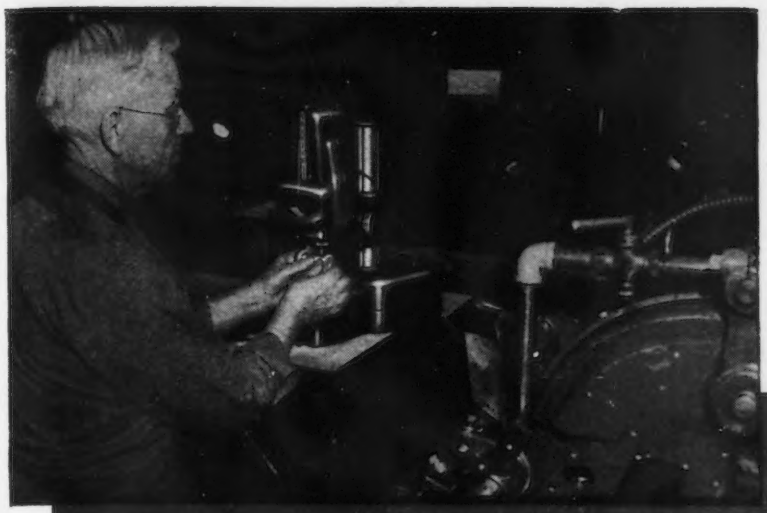
THE BULL OF THE WOODS — BY J. R. WILLIAMS

Export Items Unrestricted

Washington

• • • **In a further** effort to speed disposal of war surpluses, WAA has removed virtually all its restrictions on sale of items for export purposes. While it will not differentiate between buyers for domestic or export use, WAA emphasized that such purchases are subject to export licenses and such controls as are exercised by other governmental agencies.

The action is subject to the following exceptions: No sales are to be made to Canadians without clearance with the War Assets Corp. of Canada; no export sales are to be effected with nonprofit institutions until domestic needs of such institutions have been met; and, export sales of arms, ammunition and other military items shall be governed by WAA Reg. 1.



"Measuring at the Machine" MINIMIZES PRODUCTION LOSSES!

Reducing production LOSSES means reducing production COSTS. LOSSES usually occur at the machine—stopping such losses brings down costs.

"Measuring at the Machine" brings the following advantages which contribute to being able to sell a product profitably at or under competitive prices:

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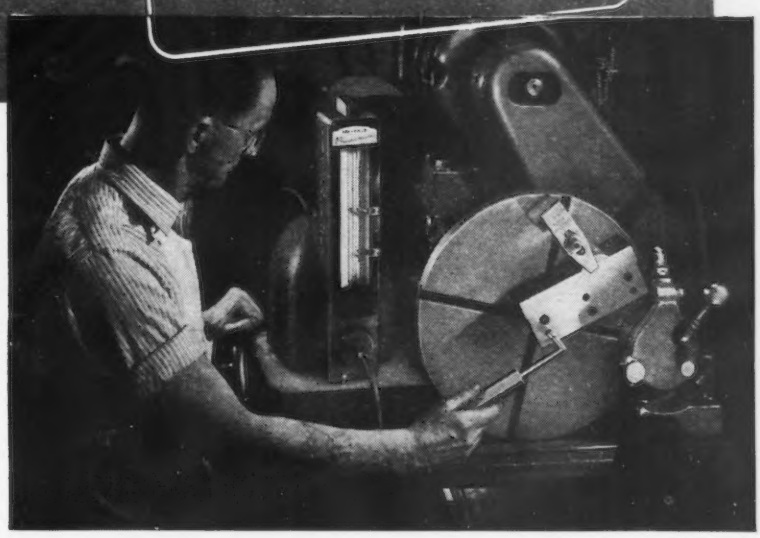

SHEFFIELD — BETTER CRAFTSMEN

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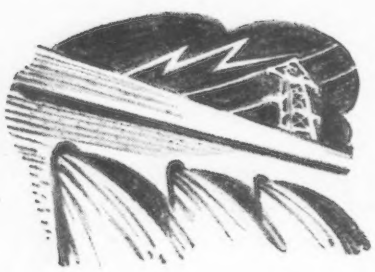
MACHINE TOOLS...GAGES
MEASURING INSTRUMENTS
CONTRACT SERVICES

West Coast . . .

ROBERT T. REINHARDT

• Western purchasing agents get the facts on steel shortage... Portal-to-portal suits not in favor with AFL leader . . . Metalworking machine sales reflect Los Angeles industrialization.



SAN FRANCISCO — Western purchasing agents in conclave here last week for the first annual meeting of the Pacific Intermountain Purchasing Agent Assn. were given the low down on the steel situation by F. B. DeLong, vice-president and general manager of sales, Columbia Steel Co.

Harried by the lack of steel in many forms the purchasing agents could get but little solace from Mr. DeLong's talk. In part he said:

"There is no one cause, but rather a series of causes for the present steel supply situation. We must recognize in the first place that the tight situation in steel is not confined to the West Coast. It is of a national nature. While it is true that our circumstances are aggravated in some measure by regional factors, we will continue to be faced with the problem of demand exceeding supply until the balance is reached across the country. In our economy, one region cannot long have plenty while another suffers from the lack of steel."

The steel executive placed the cause of the steel shortage as the heavy demand which has reached a record high for a peacetime period and has prevented the accumulation of anything like a normal inventory by mills, factories, jobbers and distributors.

Mr. DeLong said, "Such inventories are the raw material pipe lines from steel mill to factory, and I am frank to say that it would take the large part of a year's production in many steel products to fill this pipeline. . . . Under these circumstances we can pour material into one end of the pipeline for a long time before a trickle appears at the other end. If you doubt that, recall for a moment the difficult days of 1942 and 1943 when we were dependent on that pipeline for planes, tanks and guns."

To these purchasing agents and others dependent upon steel sheets for their production the shortage continues to be very real. However, some slight hope has been expressed by warehousemen and others that under the new price system where deliveries are made f.o.b. the mill some relief may be afforded.

Two of the governmental agencies which have been aggressively fighting for a greater share of the national sheet production for the West Coast continue their battles. The CPA and NHA are both ardently ferreting out the actual requirements for construction and housing in the West and continue to bombard Washington officials with data designed to impress the Federal Government with the situation on the Coast in the hope of getting support for greater allotments to this area.

SEATTLE—Although long considered as a stronghold of organized labor, this area is developing some interesting thoughts on the portal-to-portal situation.

Evan Wefton, president of the Washington State Federation of Labor, an AFL organization, has expressed himself as believing that the portal-to-portal pay suits of unions throughout the country are threatening to jeopardize the whole structure of collective bargaining. He said he is not opposed to portal pay—provided that it is negotiated as a part of the labor agreement arrived at by collective bargaining. It should not, he maintains, be demanded retroactively as far back as the statutes of limitations will permit when it is not a part of a previous nor existing contract.

According to Mr. Wefton he fears that unions taking the claims into court without first negotiating with the employers, will place themselves in a position of accepting a principle doing away with the union's right of free collective bargaining without outside interference. He further stated that practical people must realize that a multitude of firms and businesses would be forced into bankruptcy if they were directed to make retribution without the statutes of limitations applying in the various states.

Robert L. Ferguson, financial secretary of the local chapter of the United Steel Workers, reports that about 200 employees of Bethlehem Pacific Coast Steel Corp. are eligible for portal-to-portal pay. He states that his union office is carefully screening all employees to determine which should and which should not get the contested pay. Those who will be able to make claims here, according to Mr. Ferguson, are the employees in the openhearth department and workers who have to clean up on their own time. He reports that in most departments at Bethlehem the relief system has allowed workers to clean up after work on company time although they have had to prepare for work on their own time. This plan cancels out all claims to portal pay according to most observers.

NO action has developed from the aeronautical mechanics union bargaining for employees at the Boeing Aircraft Co. Their lawyers are reported to be studying the possibilities of filing claims.

Local attention was focused on the Boeing Aircraft Co. plant for another reason last week when

residents of the south part of town kept the telephone lines busy calling the airport and daily newspapers to report that they were hearing strange and terrific noises that indicated a large airplane might be lost in the fog and about to crash. Some reporters even claimed to have heard the crash. Later it was revealed by Boeing engineers that the noise emanated from their laboratories where there was a "general testing of new power plant units." Best information available indicates that the noise developed from testing of turbo-jet propulsion units developed experimentally. Whatever the source of the noise, there is every indication that Seattle residents are going to hear more of the same in the near future.

Already harried with the normal difficulties of maintaining safety on the highways, Washington State Patrol and city police are more unhappy than usual.

It seems that the state automobile license plates for 1947 have been made of scrap aluminum in the Walla Walla penitentiary and the natural color of the metal has been used as a background and the numerals painted green. The overall effect is pleasant to see in normal daylight but apparently the plates can't be read at night from a distance of more than 17 ft.—the two colors blend together under lights.

Scarcity of steel sheets normally used for this purpose forced the state to use scrap aluminum and latest reports are that these aluminum plates will be carried not only through 1947 but also through 1948.

PORTLAND—A recent survey completed by the Chamber of Commerce reveals that approximately one-fourth of the total industrial employment in this area is in the metal production or metalworking industries. Approximately 16,000 persons are employed in 395 different plants, including producers of cutlery, tools, hardware, heating apparatus, castings, welded products and tool and die works.

With the three aluminum reduction plans at Troutdale, Ore, Vancouver, Wash., and Longview, Wash., in operation to turn out 400 million lb of pig aluminum a year, this city is in a favorable position for light metals fabrication.

The largest industrial expansion in the history of this area took place during 1946 when a total of 179 new industrialists started operations. It is estimated that the potential employment of these new manufacturing enterprises alone will approximate 3500 persons. Many of these companies represent local capital and only eight are branches of nationally known concerns.

LOS ANGELES—Southern California's industrial expansion continues, as reflected by year end figures just released to THE IRON AGE by the Metalworking Machinery Division of the Los Angeles office, War Assets Administration. According to a sales, stock and market analysis prepared by L. Z. McKean, chief of the division, WAA machine tool sales indicate heavy absorption by the formerly small Los Angeles market.

At the beginning of 1946, the Los Angeles WAA region had a $3,940,138 inventory of metalworking machines. At the close of business Dec. 31, inventory was $9,828,000. Sales for 1946, however, totaled $15,333,849 at acquisition cost.

Indicative of the kind of machine tool market in which these sales were made, is the fact that when, on Oct. 28, WAA authorized sale by bid or negotiation of tools over 25 years old, only six such tools were found in the Los Angeles region, Mr. McKean pointed out. When a nationwide slash in prices was ordered Oct. 1 on machine tools in long supply, an order affecting a $350 million national stock, only 116 such tools were in the southern California area.

Nationwide surveys have indicated that southern California machine tools are heavily concentrated in aircraft, and other metal consuming industries, with less than 2 pct of the tools over 10 years old. This fact, the McKean report points out, indicates that WAA's Los Angeles sales were to new plants and expansions, rather than for replacement.

SALT LAKE CITY—The biennial drive to impose a severance tax on the mining industry of Utah has been renewed in the current session of the state legislature. A bill introduced into the house by a group of pro-labor representatives would levy a tax of 5¢ per ton on coal, metal ores, oil, salt, sand, gravel, forest products or any other natural resource which can be readily measured by weight. An exemption of 1000 tons per month would be allowed. Natural gas would be taxed on a basis of two mills per 1000 cubic feet. The revenue is sought for the state school system.

Individual companies which would make the heaviest payments under the proposed tax would be Utah Copper, which mines around 100,000 tons of ore daily at peak production, and Geneva Steel Co., which would be taxed on coal, iron ore and limestone.

In view of Governor Herbert B. Maw's appeal that industry be encouraged to locate in the state by favorable legislation and the announced antipathy of many legislators toward tax increases, odds appear to be heavily against the bill's passage at this stage of the session, but pressure for funds sometimes changes legislative minds.

The AFL, which has hung doggedly to bargaining rights at the Geneva Steel Co. plant against an unceasing organizing campaign by the CIO United States Steelworkers of America, has agreed to an election Feb. 12 and 13. The AFL won the first bargaining election in 1944 and was victorious again in the summer of 1945 by a 1 vote margin, when only a few hundred workmen were employed at the plant.

CF&I Reports on Earnings

Denver

The Colorado Fuel & Iron Corp. recently released its quarterly report of operations and earnings for the quarter ended Dec. 31, 1946.

The net earnings after estimated taxes, depreciation, depletion and interest were $876,310 for this quarter as compared with a loss of $452,214 for the corresponding period ended Dec. 31, 1945, and net earnings of $1,025,126 for the last preceding quarter ended Sept. 30, 1946. The earnings for the quarter ended Dec. 31, 1946, represent 66¢ per common share on 1,126,775 shares after quarterly preferred stock dividend requirements.

Earnings on the same basis represent $1.46 per share on 1,126,775 for the 6-month period ended Dec. 31, 1946.

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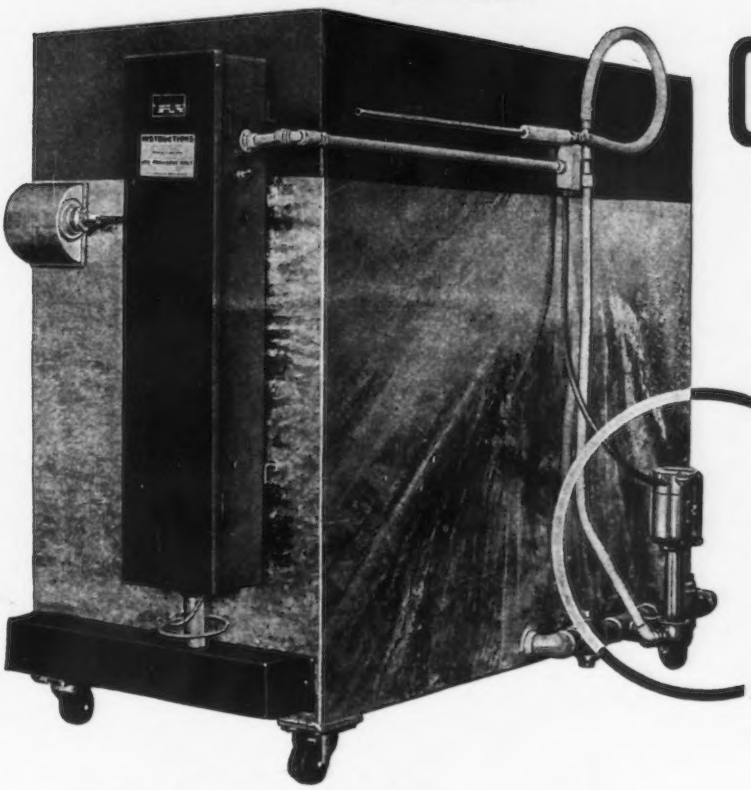

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We will be glad to advise you on your requirements both in a standard model pump or a pump for specialized requirements.

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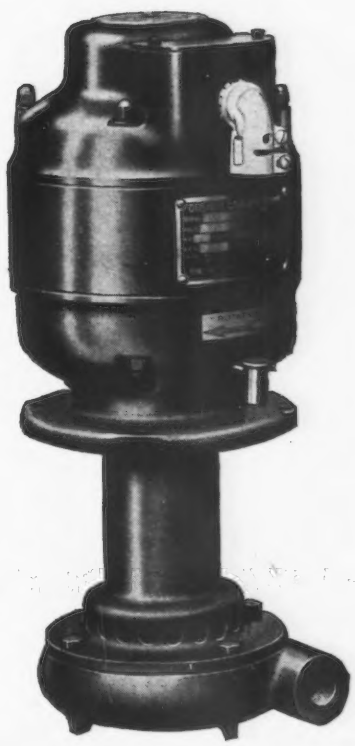

THE RUTHMAN MACHINERY CO.

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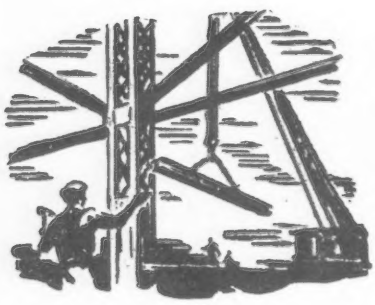
European Letter . . .

JACK R. HIGHT

• Although it might not last, British steel industry's drive for expanded sheet output shows substantial results . . . Some fear strike of London drivers may be followed by others.



LONDON—Constant pressure by the steel industry in the past year to expand sheet production has shown substantial results, although it seems likely that there will be an end at some point to the continual advances which have been achieved in the past months. The first signs of a serious shortage of sheet was noted by the British industry approximately one year ago, at the time that the real postwar demand began to make itself felt.

All of the usual factors were present in this increased demand for sheet, as well as some which are peculiar to the United Kingdom. This country has always depended heavily upon imports of timber, and shipments have not been resumed since the war on their prewar scale. One of the favorite substitutes is light gage sheet. A broad government housing program also constituted an entirely new market for sheet steel.

Having closed down 17 pct of the British sheet industry during the war to concentrate production, the steel industry ran into serious difficulty last year in attempting to reopen the hand mills which had been closed. The primary source of embarrassment was the absence of labor. Knowing that the jobs were hot and heavy, eventually doomed when new hot strip mills are built, British labor has been reluctant to go back into the old sheet mills.

The industry, with the assistance of the government, took a number of countermeasures, but they were slow in becoming effective. The government established a special plan to speed up the discharge of skilled labor in the armed forces—the demobilization program here has been slower than it was in America—and the steel industry took advantage of this program to get as much skilled labor as possible. As with any plan just being initiated on such a broad scale, the results were slower than the industry hoped, but in the last quarter of 1946 the effects began to show in sheet production.

A SPECIAL training plan has also been set up to initiate new boys into the trade, and some favorable results have been achieved in this line as well. The young men get 6 weeks of work in the mills as a training period for which they are paid.

In addition to reopening the old hand mills, considerable effort has been directed toward obtaining increased outputs from the two existing hot strip mills at Ebbw Vale and Shotton. In the case of the latter, the installation of the mill proper was completed just before the war, but the firm did not have the opportunity to install all of the additional facilities necessary to get the maximum of sheet from the mill.

As a result, due to a bottleneck in the cogging mill at Shotton, and also in heating facilities, the mill was operating at less than capacity. As a temporary expedient, alternative sources of ingots and slabs were arranged. At one time during 1946 slabs were arriving from the United States, but to the dismay of the firm these deliveries dwindled down to nothing during the last half of the year.

To replace them, it was arranged within the industry here for an armor plate mill at the Beardmore Steel Co. in Glasgow to roll slabs. Later, similar arrangements were made for plate mills belonging to Colville's and to the Consett Iron Co. to furnish additional slabs. The operation of a new reversing cold reduction mill at the Shotton works is also adding flexibility to the sheet program (see THE IRON AGE, November 28, p. 113).

All of these efforts combined have resulted in a sheet program for the first quarter of this year that will exceed any previous period in British steel history. Second quarter production may even go higher. It is estimated that a 50 pct increase in the total tonnage of sheets will have been effected in the drive for expanded output.

JUST where this drive is leading as far as other steel products are concerned is not too clear. The sheet drive sooner or later must run up against the overall limitations of ingot production. In view of the fact that other products are in short supply as well as sheets, if not as seriously, it is certain that a point will be reached, and it may not be too far in the future, where sheet output must level off in order to maintain a balance with other production.

About two-thirds of the old hand mills for sheet production which were closed down during the war have already been reopened, so the possible additional improvements from this source are limited. Although a modest addition might be made to the output from the two continuous mills, the reduction of imports of semis is gradually drawing a noose around the necks of the continuous mills. There is a limit to the amount which can be "gleaned" from the scraps of an already too tight allocation program.

The overall coal cut, announced by the government for the last half of January and all of February due to a national shortage, which will take away about 20 pct of the industry's fuel supply, may of course play havoc with the sheet program for this quarter, but the British industry will probably make considerable efforts to maintain sheet production wherever possible, even at the expense of some other items.

On the consumption side the government is on its way to wipe out one of the newest large-scale con-

538 INGOTS CAST IN ONE GRAPHITE MOLD!

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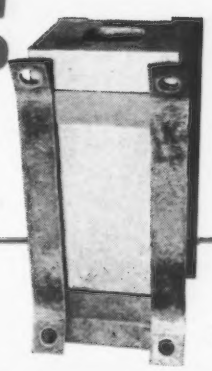

The graphite mold in which 538 ingots were cast

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No stickers—stripping 30% faster.
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Heat conductivity 2-3 times that of cast iron.
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sumers of sheet, the government sponsored housing program. This action will be a blow to the overall housing drive which is one of the prime political shouting points in England, but would help to relieve the pressure on sheet allocations.

THE British Labor Government has just come through one of its worst strikes and strike scares as a result of an unofficial stoppage which started with London haulage drivers, particularly handling food supplies. Workers in the docks and in wholesale food markets marched out in sympathy, and shipments have been on an extra-normal basis for two weeks.

The union directly concerned was the powerful Transport & General Workers, which is one of the mainstays of the Labor Party, and there has been a heavy apprehension that a general transport strike tieing up London's bus and subway workers might be the touchoff for another general strike reminiscent of the 1926 tragedy.

Despite the opinions of trade union members of the government, the Cabinet and Prime Minister took the attitude that getting the food to the people was a primary function of the government, and with an unctious apology from the Minister of Food to the strikers, troops moved into the food markets with Army and Royal Air Force trucks to move food to the retail shops.

The action with the troops reduced what might have been a serious disruption in food supplies to a serious annoyance that only added to the weight of petty troubles that are making the English people a gloomy, pessimistic, cynical group today. Last week's meat ration, 24¢ worth per person as usual, unfortunately could not be purchased in many quarters due to the strike. Some people got half their ration, coming out to one lamb chop for the week, instead of the customary two. There is a sign up in most butcher shops this week that all unhonored rations for last week will be made up, but it cannot be managed this week, and most people just do not expect to ever get it.

The strike was settled by the offering to the workmen of about everything that they had asked for. A 44-hr week, an 8-hr day, with overtime for more than 8 hr were the principal demands. An official Wages Board had been handling the negotiations prior to the strike for 9 months, until the union took the case into their own hands, and went out. There is some concern that the success may prompt others to give up the mediation channels that have been so well established over here, in favor of direct action. Otherwise, most people are heaving a sigh of relief, and trudging off to take their place in the fish queue, to try their luck.

Twentieth Century Fund To Conduct Studies On Resources of Turkey

New York

• • • **Turkey has been** selected as the first subject for a series of case studies by the Twentieth Century Fund of how American financial resources and technical skills might be used to assist other countries to develop their own possibilities and attain higher living standards for their citizens, according to an announcement made by the fund. It will make at least two other such studies during 1947.

The fund has appointed Max Weston Thornburg to direct the investigation of Turkey's resources and development and investment possibilities. Mr. Thornburg served during the war as special assistant to the Under-Secretary and Petroleum Adviser to the Dept. of State. He was formerly chairman of the board of engineers of the Standard Oil Co. of Calif. Associated with Mr. Thornburg will be Graham Spry, who has had wide experience in economic investigations and has written on economic and social subjects.

Mr. Thornburg and Mr. Spry will make an extended visit to Turkey in the near future and hope to have the cooperation of the Turkish government in making their survey. They will recruit a local staff in Turkey to assist them in gathering facts and preparing their report, which they plan to complete within a year.

In describing the new survey, Evans Clark, executive director of the Twentieth Century Fund, said, "We are scheduling studies of countries in both the Eastern Hemisphere and the Western Hemisphere. We expect to make definite announcement of other studies shortly. The board of trustees of the fund has authorized three surveys as an initial experiment, and if they are successful probably the Fund will make additional investigations of conditions in other countries.

"Our primary purpose, however, is not to point out money-making opportunities. The goal of these surveys is to make sincere and useful suggestions as to how American money and American products and technical knowledge can work in conjunction with the human and material resources of the country itself to help its people to raise their standards of living. We want to help the country to attain the material and social well being, the improved health and educational services and higher living standards generally, that modern technology makes possible."

Shipment of Crawler Tractors in '46 Hit Peacetime Peak Level

Washington

• • • **Shipments of** crawler tractors, the type most extensively used in mining, construction and other heavy industries, reached a record peacetime level of 26,007 units in 1946, according to a CPA report.

CPA said that there were no authentic estimates on pre-war production of this type of tractor, but industry sources said that current production was well above any previous peacetime level.

The five manufacturers of the crawler-type tractor include: Allis-Chalmers Mfg. Co., International Harvester Co., Caterpillar Tractor Co., the Oliver Corp. and the Linderman Mfg. Co.

Because of the heavy domestic demand for crawler tractors, total export shipments were only 4,857 units, or 18.7 pct of total shipments as compared with a 20 pct ceiling on such export shipments. Shipments against a 300-unit program which extends into 1947 for the United Nations Relief and Rehabilitation Administration are included in the above total.

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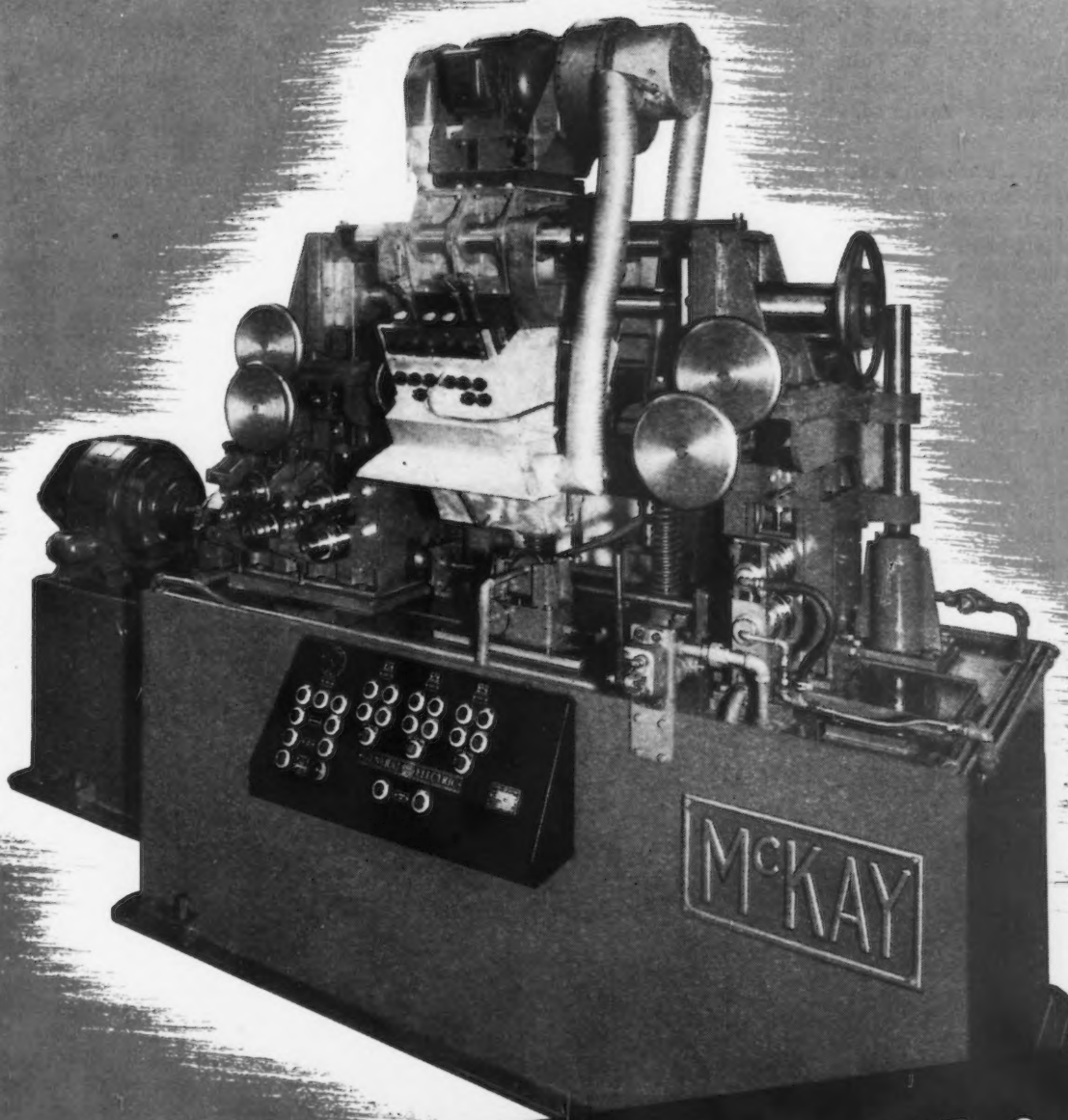
Machine, as illustrated, is designed for welding tubing from 1/4" o.d. to 1 1/4" o.d. with a speed range of 2 to 40 feet per minute.

Equipment illustrated mounts a General Electric Atomic Hydrogen Welding Head with six arc spaces equipped with three arcs.



The **McKAY MACHINE** *Company*

ENGINEERS AND MANUFACTURERS OF SHEET, TIN, AND STRIP MILL EQUIPMENT

YOUNGSTOWN, OHIO

ASSOCIATED COMPANY The WEAN ENGINEERING CO., Inc. • WARREN, OHIO

PERSONALS

o o o

• **John H. Friden,** vice-president and a director of Sun Tube Corp., Hillside, N. J., has been made executive vice-president, and **R. Smith Schenk** has been elected vice-president and a director.

• **Frank W. Hamilton, Jr.** has been appointed assistant to the president of the Ulster Iron Works, Dover, N. J. Before joining the Ulster Iron Works he had served in the Navy for over 5 years.

• **Buford M. Stubblefield,** recently appointed general superintendent of the Campbell works steel plant, blast furnaces and Struthers works, has been named Chicago district manager by Youngstown Sheet & Tube Co. Mr. Stubblefield succeeds **R. S. Poister,** who has resigned.

• **Fred W. Parker** has been named assistant to the president of Timken-Detroit Axle Co., Detroit. He has been associated with Timken since 1927.

• **Ray E. Valentine** has been made assistant district sales manager in the St. Louis railway sales office for National Malleable & Steel Castings Co. He joined the company in 1913. During World War II he was chief of the Malleable Iron Section, Forgings & Castings Branch, WPB, returning to the company as St. Louis railway sales agent in 1945. **John R. Kingman,** field engineer in the St. Louis office, succeeds Mr. Valentine as sales agent.

• **Herbert H. Snowden** has been appointed assistant general superintendent of the rod and wire mill department, Portsmouth Steel Corp., Portsmouth, Ohio. Mr. Snowden was formerly with J. A. Roebling's & Sons Co., and more recently was works manager of Seneca Wire & Mfg. Co.

• **Arthur E. Gibbs** has been named assistant sales manager of the Chicago sales district and **Charles L. Smythe,** assistant sales manager in charge of the Cleveland and Ohio and western Pennsylvania sales district, Cleveland Graphite Bronze Co. **Charles A. Williams** becomes assistant to the sales manager in charge of coordinating branch sales activities at the Cleveland office.

• **Col. G. deFreest Larner** has been elected a director of the H. K. Porter Co., Inc., Pittsburgh. He has been assistant to the president for several years.

• **Richard W. Shanklin,** former branch manager for the White Motor Co. at Long Island City, New York, has been named sales manager, wholesale division, with headquarters at the home office in Cleveland.

FRANK G. KAUFMAN, whose appointment as vice-president in charge of product engineering, Cleveland Cap Screw Co., was announced in the Jan. 23 issue.

• **R. S. Poister** has been elected a vice-president of Crucible Steel Co. of America. Mr. Poister, formerly of Youngstown Sheet & Tube Co., will make his headquarters in Pittsburgh.

• **Robert W. Cornell** has been elected a vice-president of the Parker Appliance Co., Cleveland. Mr. Cornell, who has been comptroller of Parker Appliance for the past year, will be responsible for all manufacturing and related activities of the company in his new position. **Otto P. Bereit,** formerly assistant comptroller of Parker Appliance Co., has been elected comptroller and **F. A. Herrington,** assistant treasurer. Mr. Herrington was formerly connected with the J. M. Cleminshaw Co.

• **Harry M. Heckathorn** and **Charles A. Morrow,** vice-presidents of Mullins Mfg. Corp., Salem and Warren, Ohio, have been elected to the firm's board of directors.

• **Henry P. Reid** has been appointed chief engineer of the Universal Atlas Cement Co., New York, subsidiary of U. S. Steel Corp. He joined the company in 1924 and served as special engineer, operating engineer, and since 1942 as assistant to president.

• **W. H. Williams,** president, Clark Controller Co., Cleveland, has been elected to the newly created post of chairman of the board, effective Feb. 1. **R. H. Hoge,** who has been vice-president and general manager of the company, succeeds Mr. Williams as president. **H. B. Claflin** is resigning as vice-president, effective Feb. 1.

• **Paul H. Dow** has been appointed sales promotion manager of Bryant Heater Co., Cleveland. Mr. Dow was formerly associated with the Airtemp Div., Chrysler Corp., in charge of public relations and dealer relationships.

• **D. Emerson George,** for the past 16 years manager of locker sales for Berger Mfg. Div., Republic Steel Corp., Cleveland, has been appointed manager of Berger's New York City branch. Mr. George will be succeeded in his present position by **William J. Young, Jr.,** a member of the sales department.

• **John B. Girdler** has been appointed assistant general manager of sales of the Vanadium Corp. of America, New York. Formerly district sales manager, Mr. Girdler will continue to handle the corporation's sales in the eastern district.

• **Park Sanderson** has been appointed manager of the Boston plant of Joseph T. Ryerson & Son, Inc. He succeeds **Herbert C. Wills,** who is retiring. Mr. Sanderson was an executive with the E. P. Sanderson Co. when that company was acquired by Ryerson in 1926. He continued with the Ryerson organization in the capacity of sales manager.

• **Robert L. Clause** is retiring as vice-chairman of the board of directors of the Pittsburgh Plate Glass Co., Pittsburgh, effective Feb. 1. He has served in that capacity since 1944. Prior to his election to the vice-chairmanship, he served as president of the firm for a 3-year period.

• **Walter B. Archer,** for many years connected with specialized lubricants activities in the Detroit area, has been appointed Detroit district sales manager for the Hodson Corp. of Chicago.

• **Clarence R. Abitz** has been appointed general manager of the McKees Rocks Works of the American-Fort Pitt Spring Div. of H. K. Porter Co., Inc., Pittsburgh. Mr. Abitz has long been associated with the H. K. Porter Co, Inc., and for several years was general manager of the Pittsburgh plant.

• **Irving Lipkowitz,** economist in the Antitrust Div. of the Dept. of Justice, has resigned to take a position with Reynolds Metals Co., Inc., Richmond, Va., as its economic adviser.

• **John Airey,** president of King-Seeley Corp., has been elected president of the Automotive & Aviation Parts Manufacturers, Inc. Mr. Airey succeeds Frederick C. Crawford, president of Thompson Products, Inc. **K. J. Ammerman** has been named a director of Automotive & Aviation Parts Manufacturers, Inc.

• **E. M. Schultheis** has been appointed manager of sales for the Clark Equipment Co., Buchanan, Mich. **Edwin B. Ross** has retired as vice-president in charge of sales of this organization and **Ezra W. Clark** has also retired as vice-president and general manager of the Tructractor Div. of the company. **Leo A. Bixby** has been named manager of engineering for the same organization.

• **Joseph E. Rogers,** president of Addressograph-Multigraph Corp. until his retirement a year ago, has been elected a director and member of the executive committee of Jack & Heintz Precision Industries, Inc., Cleveland. He will remain a board member of Addressograph-Multigraph Corp.

• **H. J. French** has been appointed assistant vice-president of the International Nickel Co. of Canada, Ltd. Since 1943, Mr. French has been assistant manager of the development and research division of International Nickel. His headquarters will be in New York.

• **Austin K. Thomas** has been appointed sales manager of the construction machinery division of Chain Belt Co., Milwaukee. Mr. Thomas had been eastern district manager, with offices in Philadelphia. During the war years, his office was located in Washington.

HAROLD A. HALLSTEIN, executive vice-president, Austin Co.

• **Harold A. Hallstein** has been elected to the newly created post of executive vice-president of the Austin Co., Cleveland. He joined the organization 36 years ago, and has been vice-president since 1935, and a director since 1937. He continues as assistant general manager, assistant secretary, and assistant treasurer. **Laurence E. Cooney,** vice-president and general manager of sales, and **Harold A. Anderson,** vice-president and eastern district manager, have been elected to the board of directors.

• **Walter C. Weigle** has joined Detroit Die Set Corp. and will represent them throughout Wisconsin, making his headquarters in Milwaukee. For the past 8 years, he has been with Superior Steel Products Corp. as sales manager and purchasing agent.

• **George W. Guirl** has been appointed director of sales and advertising of National Hydraulic Co., Inc., Detroit. He was most recently associated with the Hydraulic Machinery, Inc., in the capacity of sales engineer.

• **William R. Miller** has been appointed assistant manager of the metallurgical department, American Steel & Wire Co., Cleveland. **John F. Occasione** has been made division metallurgist in charge of process control, and **Merle H. Seifert** has been named division metallurgist-fine wire.

• **Dr. Igor N. Zavarine** has been named to the metallurgical research staff of Sylvania Electric Products Inc., Bayside, N. Y.

• **Oscar E. Nordstrom,** who has been Chicago district manager of the grinding machine division at Norton Co., Worcester, Mass., for 20 years, has retired from active duty but will continue to act as a consultant. He is succeeded by **Robert D. Lawson,** formerly sales representative for the Norton grinding machine division in northern New England. **B. Harold Lewis** succeeds Mr. Lawson as representative for the entire New England area except for western Massachusetts and Connecticut. His headquarters will be at the Worcester plant.

• **T. M. Dils** has been appointed plants manager of Delco Products Div., General Motors Corp., Dayton. He has been associated with the division since 1914 and prior to his new appointment was chief engineer and manager of inspection and standards for 10 years. Succeeding him as manager of inspection and standards is **Milton E. Feldstein.** His background includes 4 years as chief process engineer, 3 years as master mechanic and 5 years as general superintendent of indirect manufacturing with Delco Products Div. **C. L. Balbach** has been named to replace Mr. Feldstein as general superintendent of indirect manufacturing. Mr. Balbach formerly was general superintendent of the electric motor division. **C. O. Hutchens** has been appointed general superintendent of productive manufacturing. Prior to his new appointment he was general superintendent of the shock absorber division.

• **W. H. Brown** has been made assistant general manager and **A. E. Little**, assistant sales manager of Hoskins Mfg. Co., Detroit. Mr. Brown came to the company in 1939 after 4 years with the Ford Motor Co. Mr. Little joined Hoskins in 1945.

• **Gordon E. Medlock** has been appointed assistant manager of sales and repairs for the Stearns Magnetic Mfg. Co. brake division, Milwaukee. He has been employed in the Stearns brake factory for the past year.

• **Henry A. Gripekoven** has been made vice-president in charge of sales for Visible Index Corp., New York. Mr. Gripekoven has been with the firm, as Middle West district distributor, since 1943.

• **Henry M. Schmitt** has been named chemical industry manager of the Brown Instrument Co., Philadelphia. **O. B. Pyle** has been made industrial manager of the Philadelphia branch and **A. W. Roat** is now industrial manager of the St. Louis branch of the industrial division of Minneapolis-Honeywell Regulator Co. **I. K. Farley** has been placed in charge of the major petroleum accounts in the Philadelphia area and **Harry D. Ruch** will also work out of the industrial sales division at Philadelphia. Mr. Schmitt has been with the Brown company for the past 22 years. His successor, Mr. Pyle, has been with Brown for 18 years. Mr. Roat, with the company 9 years, has served in Pittsburgh, Cleveland and Philadelphia.

• **Albert K. Trout**, formerly emergency procurement officer, radio division, Bureau of Ships, U. S. Navy Dept., has been appointed manager of sales and negotiations of Production Methods, Inc., of New York. **Eric J. Young** has joined the firm as senior design engineer. He has recently been engaged on design and research engineering for the S. S. White Dental Mfg. Co.

• **M. J. Weber** has been named service manager of the authorized service depot program of the Quincy Compressor Co., Quincy, Ill. He has been associated with the company for the past 14 years.

• **Frederick C. Abbott** has been appointed manager of labor and personnel relations for the Pennsylvania Salt Mfg. Co., Philadelphia. Before his new appointment, he was assistant production manager. He joined Pennsalt in 1943.

• **William A. Mara** has been appointed director of advertising for Bendix Aviation Corp., Detroit, assuming the duties of **Herbert L. Sharlock**, who has been granted a leave of absence.

• **J. Dan Delanty** has been appointed resident salesman in the Tri-Cities, covering the states of Illinois, Iowa and Nebraska for Bliss & Laughlin, Inc., Chicago.

• **H. E. Beane** has been appointed general sales manager of the Bristol Co., Waterbury, Conn. Mr. Beane has been associated with the Bristol Co. since 1920.

• **John S. King** has been made manager of the Chicago branch of Fairbanks, Morse & Co., succeeding **Frank V. Roy** who retired from that position. Mr. Roy joined the Fairbanks-Morse organization in 1908.

• **Paul V. Goodman** has been appointed director of purchases of the Davey Compressor Co., Kent, Ohio. In his new position Mr. Goodman will supervise purchases of all Davey divisions.

• **Walter S. Smith**, chief production manager of the Butler Mfg. Co., Kansas City, Mo., has been elected a director of the company. Mr. Smith joined the Butler organization in 1934 as an engineer and was appointed chief engineer in 1941. **Victor Norquist**, consulting engineer, was elected a vice-president. **Arvid A. Schoning**, manager of the company's Galesburg division, was also named to the board of directors.

• **A. Gordon Wilson**, formerly with Ekco Products Co. of Chicago, has been made purchasing agent for Reynolds Wire Co., Dixon, Ill.

• **Frank T. Kusneske** has been named power plant foreman of the American Locomotive Co.'s Brooks works at Dunkirk, N. Y. He succeeds **William A. Godfrey**, who retired last Dec. 31.

• **E. C. Kron**, formerly with Battelle Memorial Institute, is now associated with the Doehler-Jarvis Corp. as metallurgist in charge of steel and iron activities of the corporation. Mr. Kron will make his headquarters at the Toledo plant.

• **Joseph Savage** has been named to the post of factory manager of Snyder Tool & Engineering Co., Detroit. **Howard N. Maynard**, treasurer of the company, has been elected vice-president; **George H. Whitehouse**, sales manager, has been elected vice-president in charge of sales; and **Kenneth B. Hollidge**, personnel director, becomes secretary.

OBITUARY...

• **D. W. Bateman**, 55, wartime general manager of the Wainwright Shipyard, Panama City, Fla., died at Panama City Jan. 8 after a long illness.

• **James D. Hunter**, 85, president of the James Hunter Machine Co., North Adams, Mass., died Jan. 7.

• **Frank O. Howard**, 60, died Jan. 13. He was affiliated with the New York office of American Steel & Wire Co.

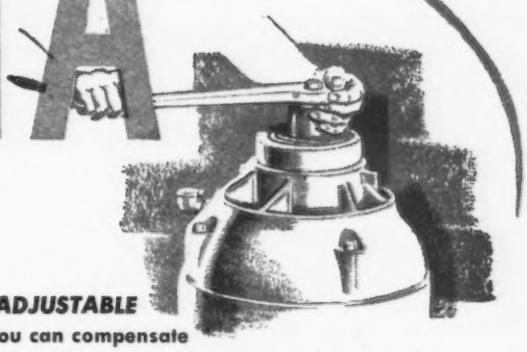
• **Charles B. Carr**, 83, for many years in charge of the Cleveland branch sales office of Gisholt Machine Co., died on Jan. 8 after an extended illness. Mr. Carr became associated with Gisholt in 1901. Except for the last few months he had continued to serve in an advisory capacity to several of Gisholt's eastern branch sales offices, following his semiretirement in 1942.

• **Henry T. Kvindlog**, plant manager for Gar Wood Industries for 27 years, died recently in Detroit.

• **Charles M. Young**, vice-president and general manager of L. A. Young Spring & Wire Corp., Detroit, died in an airline crash Jan. 12.

• **Edward J. Mockly**, 58, founder and president of the Middle States Foundry & Mfg. Co., Milwaukee, died suddenly Jan. 14 from a heart attack.

POMONA



ADJUSTABLE You can compensate your Pomona pump for wear—restore proper running clearance when at last it's necessary—by one simple "topside" adjustment. No need to pull the pump to eliminate recirculation; no high adjustment costs—and valuable pumping time is saved!

Where there's a well ...here's the way!

For pumping water from wells, pits, sumps, lakes, rivers, etc., here's the way to cut costs per gallon to the barest minimum—not only in the first year, but for many, many years to come! Pomona vertical turbine pumps have the combination you're after—high, maintained efficiency for continued low power cost, plus lowest yearly maintenance expense!

NO HIDDEN LEAKAGE! Pomona, another product of Fairbanks-Morse, protects your pocketbook against power losses and wasted water with a readily accessible shaft seal, or "packing box." Quick visual inspection and easy maintenance are assured!

WHAT DO YOU NEED? The patented Pomona revolvable, water-lubricated rubber bearing with double (inside and out) bearing surfaces means quiet vibration-free shaft support under all conditions. Fairbanks-Morse vertical turbine pumps are built in sizes from 4" to 36"—with oil or water-lubrication—semi-open or enclosed impellers. Call your nearest Fairbanks-Morse office or your Pomona dealer for information on the pump best fitted to your job.

FAIRBANKS-MORSE

A name worth remembering

DIESEL LOCOMOTIVES • DIESEL ENGINES • MAGNETOS • GENERATORS • MOTORS • PUMPS
SCALES • STOKERS • RAILROAD MOTOR CARS and STANDPIPES • FARM EQUIPMENT

Dear Editor:

OLDEST SUBSCRIBER?

Sir:

This is a very painful letter to write, for it is a request that you discontinue sending us THE IRON AGE . . . It is one of the hardest of the several acts which have been made necessary by the suspension of our business operations last June. The company was almost 81 years old and I, the sole owner, had been on the job for 52 years. As the leasehold approached expiration, an extended search for a new location proved fruitless, so that sale of the stock and placement of old employees was the only alternative, but one which was accepted with reluctance.

I doubt if you have any subscribers, or at least very few, who have been on your subscription list for a longer period. As a small boy, back in the '80s of the last century, I recall my father's reading your magazine in our home . . . Then when I entered the business in my "teen years," my father urged me to read it carefully, saying it was the "Hardware Bible." That was before the *Hardware Age* came upon the scene specializing more particularly in hardware affairs. Then we subscribed for both.

So with many thanks for the valuable contribution you have made to our business welfare and personal edification and with hearty hopes for your continuing progress and prosperity, we say "good-bye, old friends."

CECIL A. ALEXANDER
J. M. Alexander & Co.
Atlanta

● Your letter has touched us deeply, yet such a letter makes our day-to-day efforts pleasant and worthwhile. Unfortunately changes in office records over our 92-year period of existence have obscured records of subscribers for the longest continuous period. We do know that some of our advertisers have been with us since the 1860's and in comparing early advertising with that used at present, we need not tell you that there has been quite a change. But we are curious ourselves as to who is our oldest reader. Any other candidates?—Ed.

CLAY WASH

Sir:

I would very much appreciate if you could advise me where a clay wash to be used for permanent molds (not diecast molds) for aluminum castings may be obtained. I understand there is one which has to be applied only on the average of once a day.

GEORGE H. CROCKER
24 Armor St.
South Charleston, W. Va.

● G. W. Smith & Sons, 116 S. Sperling Ave., Dayton 3, manufactures a type of clay wash for permanent mold work which may serve your purpose, and a similar material known as Bonispray is made by Foundry Rubber, Inc., 1050 30th St., N.W., Washington 7.—Ed.

TANTUNG

Sir:

Can you supply us with three copies of the article, "Tantung—What it is, How to use it," by D. I. Brown, appearing in the Nov. 14 issue, p. 76.

J. H. MULCAHEY
Linde Air Products Co.
Tonawanda, N. Y.

● Tear sheets have been mailed.—Ed.

NONFERROUS ALLOYS

Sir:

Please advise if copies of the booklet "Non-Ferrous Alloy Specifications" are available, and if so, what procedure is necessary to obtain six copies.

L. H. RANSOM
Purchasing Agent
Truscon Steel Co.
Youngstown

● We are forwarding six copies of "Non-Ferrous Alloy Specifications". These booklets cost 25¢ per copy, or 16¢ each when five or more are ordered.—Ed.

REQUEST FROM SOUTH AFRICA

Sir:

In your Dec. 5 issue on p. 67 appears an article on automatic welding by means of flexible coated electrodes. This article is of great interest to us and as subscribers to your magazine, we would be very much obliged if you would request Hollup Corp., Chicago, who developed this electrode, to furnish us with full information on the electrodes and the control device, by air mail.

L. A. WOODWORTH
Technical Manager
Hall, Longmore & Co., Ltd.
Luipaardsvlei, South Africa

● We have air-mailed your request to Hollup Corp.—Ed.

TUBULAR RIVETS

Sir:

We have noted your "Dear Editor" page for some time and the real help which you have offered to others requiring a wide variety of "help, aid, succor and assistance." We will appreciate it if you can help us likewise, by furnishing us with names and addresses of manufacturers of small high-speed tubular rivet heading (cold upsetting) machines, capable of producing tubular rivets with shank diameters from 1/16 in. through about 3/16 in.

C. B. GWYN, JR.
Chief Engineer and General Manager
Tungsten & Sintered Metals Div
H. A. Wilson Co.
Newark, N. J.

● Names of manufacturers of rivet heading machinery are being forwarded.—Ed.

STUDEBAKER'S RECORD

Sir:

It is perhaps too late to do anything about it, but may we call your attention to the statistical issue of Jan. 2, p. 150 where Fig. 2 shows Studebaker assembly closed for the first quarter of 1946. We were shut down the last quarter of 1945 due to the Warner Gear strike, but ran consistently on the 5G or so-called interim model thereafter. The chart makes our record look like one of the worst in the industry, whereas I am certain it was one of the best . . .

ROBERT M. ROSS
Public Relations Div.
Studebaker Corp.
Detroit

● The identification symbols, we discovered after the issue had been mailed, were incorrect. We sincerely regret this error for Studebaker does enjoy one of the best records in the automotive industry. The identifying letters at the left of the chart should read: A, C, G, E, B, F, and D, listing companies in descending order as General Motors, Chrysler, Nash, Packard, Ford, Hudson and Studebaker.—Ed.

ZINC BRIGHT DIP

Sir:

. . . We would appreciate knowing the manufacturer of a bright dip finish called "Lustrone," used on zinc and cadmium plating.

E. A. HILL
Product Engineer
Palnut Co.
Irvington, N. J.

● A product known as Luster-on, an inhibited zinc bright dip for automatic or hand plating cycles, is marketed by the Chemical Corp., 54 Waltham Ave., Springfield 9, Mass.—Ed.

LIGHTS FOR ITALY

Sir:

On p. 54 of the April 25 issue we have read the article on high intensity lights. As we are interested in that subject, could you give us information where we can find a sample of that light to be sent to us here . . .

E. DEANGELIS
Metal-Lux
Milano, Italy

● We are referring your inquiry to the Electronics Div., Western Union Telegraph Co., where the high intensity light was developed.—Ed.

IDENTIFYING METALS

Sir:

I wish to find out how to test different metals such as pewter from black tin, lead, babbitt, silver and gold, and have been referred to you by the ASTM as the source of an article entitled "Quick Methods for Identifying Metals" by J. E. Garside, which appeared in your issue of Oct. 17.

CHARLES DREXLER
Route No. 1
Garner, Texas

● Copies of the article are being forwarded to you.—Ed.

THE *NEW* ARITHMETIC IN STEEL

SUBTRACT— ¼ OF THE STEEL PER PRODUCT—
ADD— ⅓ MORE PRODUCTS PER TON

3 TONS OF N-A-X HIGH-TENSILE WILL DO THE WORK OF 4 TONS OF CARBON SHEET STEEL— WITH NO SACRIFICE IN PRODUCT STRENGTH

N-A-X HIGH-TENSILE is now making possible the production of more and better products per ton of steel in many plants.

It is a common experience to find that sections can be made as much as 25% lighter—with no loss of strength, and with an increase in durability. That is because N-A-X HIGH-TENSILE is so much stronger and tougher, so much more resistant to fatigue and corrosion, than ordinary carbon sheet steel. The difference between the two is so marked that three tons of N-A-X HIGH-TENSILE will ordinarily do the work of four tons of the other.

Yet with all its strength, N-A-X HIGH-TENSILE has excellent formability. It can be cold-formed and deep-drawn to produce intricate parts; and it has good weldability. These superior qualities bring you not only a better product—but also important economies in handling, fabricating and finishing.

The many advantages of N-A-X HIGH-TENSILE have created a demand that is in excess of the current supply. However, our engineers will be glad to discuss your specific problems with you against the day when this superior steel is available to all.

MAKE A TON OF SHEET STEEL GO FARTHER
Specify—
N-A-X
HIGH-TENSILE STEEL

GREAT LAKES STEEL
Corporation

N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN
UNIT OF NATIONAL STEEL CORPORATION

Industrial News Summary...

- ***Steel Output Reaches New Postwar Peak***
- ***Industrial Peace Seen in Steel Industry***
- ***Sales Research Men Look for Future Trends***

AN uninterrupted high level of steel output over the next 6 months, which is considered likely barring a coal strike, will establish a new peacetime peak in steel industry operations. Furthermore, the production of finished steel products during that period will result in one of the greatest flows of manufactured goods to the consumer since VJ-Day.

Steel ingot operations this week established a new peak of 93 pct of rated capacity, up one point from a week ago. On an annual basis this activity is equivalent to an 85 million ton year. The extension of steel contracts to Apr. 30 practically eliminates the chance of any steel tie-up this year. This will give steel firms the long awaited chance to maintain operations at a substantially high peak and thus reduce unwieldy backlogs, make a better return on investment and eliminate by greater production some of the fringe premium price steel markets which have grown up because of the tightness in general steel supplies.

Steel wage negotiations will be inconsequential and will be restricted to legalistic interpretation of contract wordage until such time as a definite settlement of the portal-to-portal pay problem results from legislative and court action. Some time later the broad aspects of a guaranteed annual wage and a severance pay for employees who are laid off will be gone into thoroughly between the U. S. Steel Corp. and the union.

WHILE the union is not expected to obtain a modified guaranteed annual wage plan as a result of current negotiations it will not be because the U. S. Steel Corp. has not made an exhaustive study of the possibilities or is unsympathetic to the basic principles of such a modified plan.

For the past year the steel company has been using the utmost research effort in a study on the overall aspects of a guaranteed annual wage. The summary of this study is expected to be the basis for answering the union's demand during the current negotiations. It is unlikely that the steel company will give a flat "no" or close the door to future negotiations on the problem.

Such arguments as the erratic tendencies in the steel demand picture, the high breakeven point, the already heavy labor costs and the dictation of steel production by factors beyond the control of steel firms, will probably be the basis for rejection of the guaranteed wage demand at this time. Furthermore, the corporation is expected to speak up sharply on the question of steel productivity per employee and might indicate that a substantial increase in worker productivity would make the case for a greatly modified guaranteed annual wage appear in a better light. Under present conditions it is believed that a falling off in steel production of 25 pct would, from a company standpoint, completely wreck any attempts to guarantee wages for even 70 or 75 pct of the production force.

WHILE steel demand is kept in bounds only by the insistence of steel firms that orders will not be accepted beyond the second quarter, some sections of the steel industry have developed a slight tinge of anxiety over the probable trend of steel demand during the last half of this year. Many steel research officials believe that there is an even chance for a "shaking out" period later this year during which current prices will be severely tested. The old bogey of consumers eventually living off their inventories has raised its head in the minds of some steel sources.

While many steel sales officials look for a leveling off in steel production later on this year as unfilled orders are reduced, opinion appears to be sharply divided as to when it will occur, how deep it will be and how long it will last. The extension of the current wage contracts will give both management and labor a chance better to appraise future steel production trends so that a mutually beneficial wage agreement can be eventually reached.

The nation's scrap markets this week were straining at the bit, brokers were finding it practically impossible to cover at old prices and consumers were having extreme difficulty in making new purchases at current quotations. Whether or not this represents a stage set for high scrap prices remains to be seen but the situation is by no means a pleasant one for steel officials who might have to pay additional higher raw material prices thus boosting the cost of steelmaking.

BECAUSE of recent steel price increases and the current high rate of steel activity, steel industry earnings in the first quarter will probably be termed as "good." No unusually high return is anticipated because final negotiations for a wage contract will probably wind up with enough of a definite wage increase plus the cost of social benefits to keep steel industry earnings at a conservative figure.

The key to the situation in steel company earnings over the next 6 months lies entirely with the ability of steel firms to maintain operations at a high rate of output and to balance out the distribution of finished steel products so that the more profitable items represent the greatest percentage of total output.

There is little doubt in inner steel circles that 1947 will mark the beginning of a much closer relationship on the part of labor and management and a more realistic approach to each other's problems. The probability of such a condition is greatly enhanced by the absence of the Government in current management-labor deliberations.

• **RAISE ELECTRICAL SHEET PRICES**—Carnegie-Illinois Steel Corp. has announced base and extra price increases effective Jan. 27 on all grades produced by them. The base price increases in cents per hundred pounds are: Armature and electrical grades, up 25¢; motor, dynamo and transformer grade 72, up 32.5¢; transformer 65, up 2.5¢; transformer 58 and 52, up 22.5¢ field grade, up 30¢.

• **CPA REVOKES DIRECTIONS**—Effective Jan. 28, CPA has revoked directions 12, 14, 15, 16, and 17 to the steel order, M-21. Dir. 16, which established a ceiling of 25 pct of monthly production on rated orders after Dec. 31, 1946 as a result of the coal strike, is the only one of major importance. Provisions of the remaining directions are as follows: Dir. 12 was issued to establish a certification procedure for steel orders during the third quarter 1946. It has not been effective since the end of the third quarter; Dir. 14 provided that certified orders placed under Dir. 12 or 13 should be treated as rated orders during October only; Dir. 15 provided for reduction in deliveries of pig iron on certified orders during December, 1946; Dir. 17 restricted deliveries of bituminous coke. The preferences which were granted under that direction were continued after the end of the coal strike to permit utilities to build up normal inventories. The direction, however, is no longer necessary at this time.

• **ELECTRIC FURNACE PIG IRON**—Three representatives of the Carnegie-Illinois Steel Corp. are on their way to Norway to study the production of pig iron from low grade ores through the use of electric furnace melting. The Norwegians have used this process for some time and have found it very practical. The precise economy of the process has always evolved around abundant sources of cheap electricity but domestic steel producers are beginning to project their thinking into the distant future when our high grade ores may give out. Of added significance is the recent long-range program of marginal iron ore beneficiation instituted by Oliver Iron Mining Co., another member of the United States Steel Corp.

• **EXPORT DIRECTIVE AMENDED**—By amending Dir. 10 to Order M-21 CPA has removed the 2 pct ceiling on rated (CXS) steel orders for export effective Jan. 28. CPA said that while the rated export program will still be held to 2 pct on an overall basis for some products, it will be found necessary to exceed this percentage. Tinplate is a notable example.

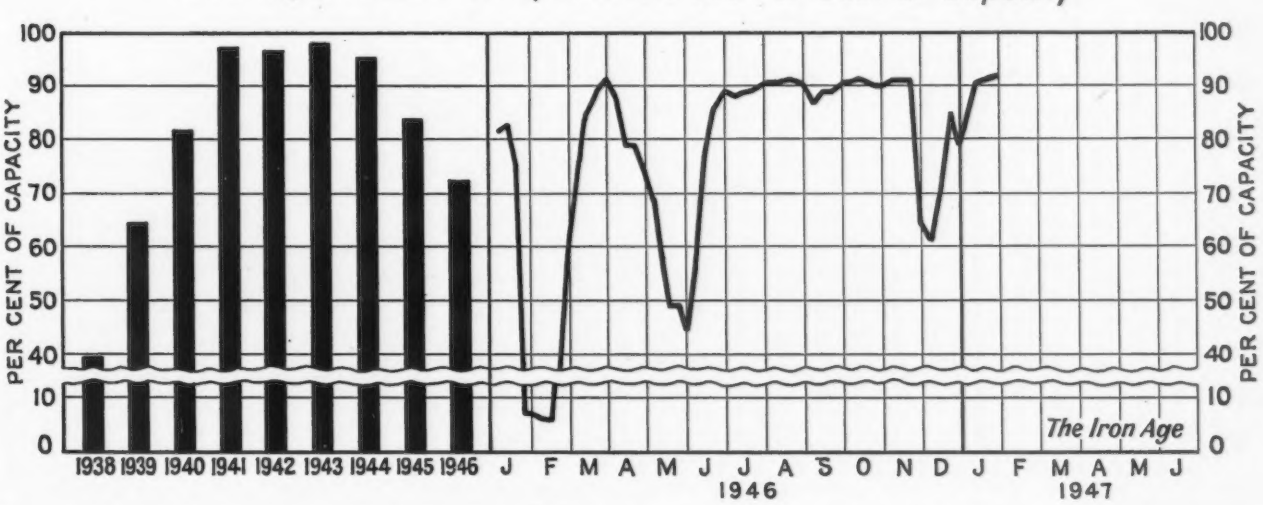
• **SELECTIVE SERVICE DEFERMENTS**—Pending decisions regarding the extension of the Selective Service Act beyond Mar. 31, all applications for occupational deferment of workers in industrial and foundation research are now being certified by CPA, following the expiration of the Office of Scientific Research and Development on Dec. 31. Students and full-time employees engaged in advanced studies or university research are certified by the Office of Education.

• **GEAR SALES UP 27 PCT**—The gearing industry, as represented by the members of the American Gear Manufacturers Assn., shows an increase in volume of sales for December 1946, as compared with November 1946, of 27 pct. This report does not include turbine or propulsion gearing. The index figure for December was 425.

• **U. S. STEEL EARNINGS**—U. S. Steel Corp. reported a net income of $31,215,636 for the fourth quarter of 1946 compared with $33,329,353 in the third quarter of 1946 and $13,267,300 in the fourth quarter of 1945. Net earnings for the year 1946 were $88,683,530 compared with $58,015,056 in 1945. On a per common share basis fourth quarter 1946 earnings were $2.86; for the year 1946 $7.29 and for 1945 were $3.76. Income for 1946 would have amounted to about $59,500,000 had not strike costs amounting to $29,200,000 been charged to a special fund. Shipments in the fourth quarter of 1946 were 4,902,742 net tons compared with 4,457,557 in the third quarter of 1946 and 4,096,568 net tons in the fourth quarter of 1945. Steel production in the fourth quarter of 1946 averaged 87.4 pct of rated capacity compared with 94.3 pct in the third quarter of 1946.

• **UP FOR SALE AGAIN**—Once again the giant American Steel Foundries surplus war plant is being offered for sale or lease by the office of real estate property disposal, WAA, in Chicago. Bids on the plant, which contains more than 1¼ million sq ft of area at East Chicago, Ind., will be opened 3 p.m., Feb. 17, 1947, at the LaSalle Street office of WAA. When previously offered, the giant foundry attracted no bids although several corporations expressed interest in the plant. The foundry was operated during the war by American Steel Foundries and built at a cost to the government of $26 million, including $11½ million for the plant and $14½ million for equipment.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
January 21.....	101.0	90.5	90.0*	94.0	96.0	102.0	98.0	99.0	98.5	89.0	94.0	66.0	86.0	92.0
January 28.....	102.0	90.5	90.0	93.5	97.0	102.0	100.0	99.0	102.5	90.0	94.0	76.0	95.0	93.0

* Revised.

Steel Sales Research Men Look for "Corrective Period" in 1947

See Many Favorable Factors Despite Some Similarity To 1937 Conditions

By TOM CAMPBELL
News—Markets Editor

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New York

• • • Because realistic and soul-searching opinions on the future trend of manufacturing activity are unpopular at the present time, some steel officials who see a "shaking out" period ahead are keeping such thoughts to themselves even though they privately think strongly on the question. This is particularly true in the case of steel company sales research and statistical workers whose efforts eventually find their way into studies which are supposed to be closely scrutinized by the top heads.

In recent weeks highly placed steel officials have been doing some considerable worrying about the future trend of steel production and sales volume especially during the last half of this year. Most of these same officials are recalling that the sharp drop in new business during the fall of 1937 caught the industry unawares. They are also recalling with pains of apprehension that some of the factors in the steel market today are not too different from those present during the middle of 1937 when new highs in steel sales and output were being freely predicted by sales officials.

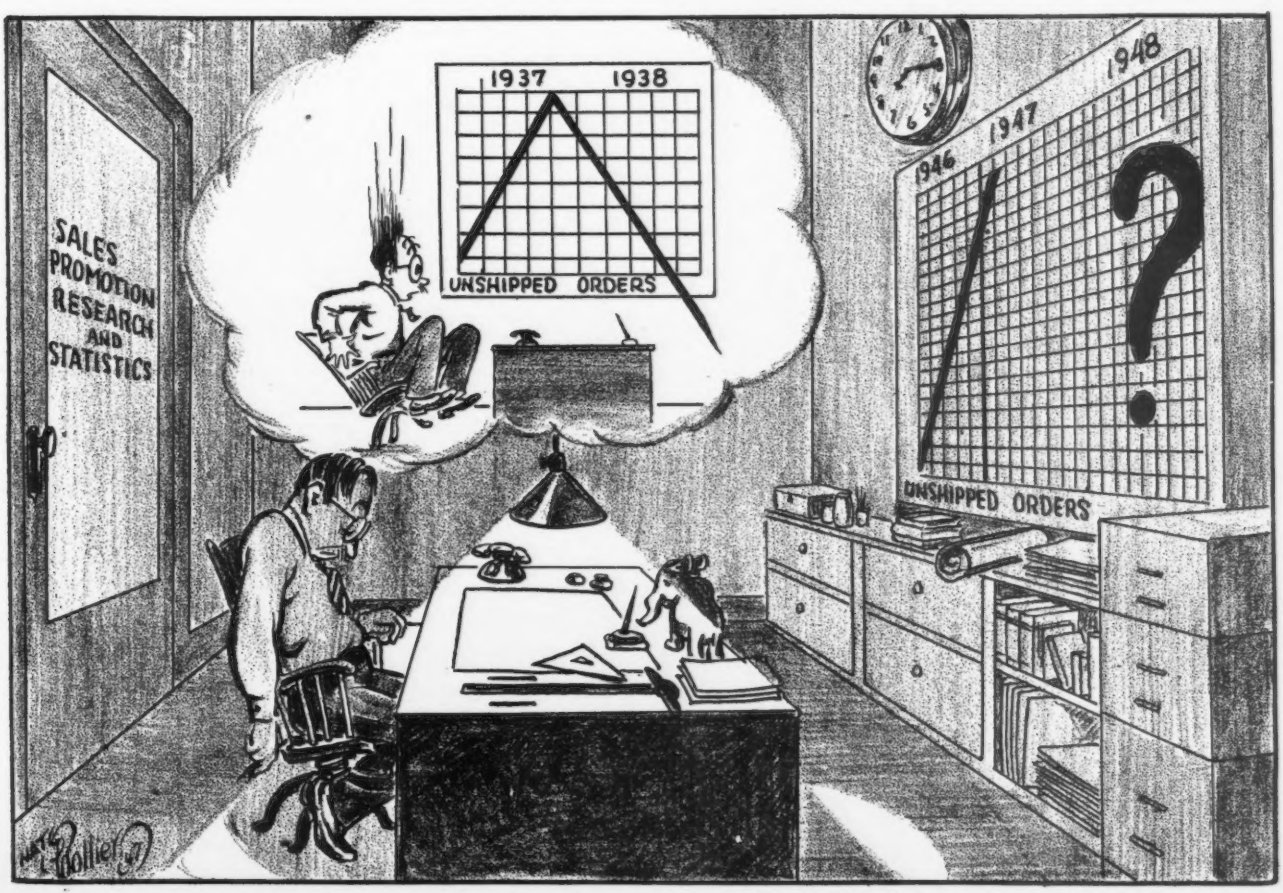
During the latter part of 1936 the nation was just emerging from a major depression and for the first time there was the possibility that the steel industry could again make a considerably greater tonnage of steel and perhaps some profit. Prices at that time were low because of price cutting competition during the depression and for that reason were advanced during the latter part of 1936. These advances caused a stampede of customers attempting to beat the price increase by placing orders far ahead.

A similar buying spree occurred during the first quarter of 1937 when it became evident that a price increase was in store for the second quarter of 1937. In those days the industry was unable to adhere to a "price at time of shipment" policy. The result of this rush by consumers to protect themselves against further price increases was the accumulation of one of the greatest volumes of unshipped steel tonnage since World War I.

By the middle of 1937 when customers began to take mid-year inventories, it was obvious to a few that steel buying should be completely stopped until record-breaking stocks in consumers' hands were liquidated. From the fall of 1937 until the fall of 1938, or better, the spring of 1939, the output of steel was gaged strictly to the volume of new business which was drastically below the average for the first half of 1937.

During that period steel consumers liquidated their unusually large stocks and by the middle of 1939 were in a more receptive po-

Do Dreams Come True?



sition to purchase steel, especially since competition among steel companies for available business during 1938 caused several serious price breaks in major steel products. The war in Europe and later the entry of the United States into the war replaced the domestic steel demand which might have run its course during 1940 to 1942.

Steel research officials believe that there is an even chance for a shaking out period some time this year but the opinion is sharply divided as to when it will occur, how deep it will be and how long it will last. Practically no steel official who has been approached on the matter is happy about the present steel price structure. However, after looking over costs of some of the low-return items and digesting studies on the effect of remote steel selling, to say nothing of material and freight rate increases, steel firms were practically driven by circumstance into the recent flurry of price rises. These increases took the composite price for finished steel—on base prices alone—up 25 pct from the 1939 average and also made it higher than the average in the first quarter of 1937.

There is more than a suspicion that the recent price increases anticipated at least part of the wage increase which steel companies will soon grant but it is also true, according to reliable sources, that the industry is in no position to pay a substantial wage increase in addition to social benefits.

Steel consumers, however, have a disagreeable way of caring little about steel industry troubles and yelling long and loud about steel price advances, especially when they include basic changes and increases in extra charges. Currently steel users have not made much noise about the steel price structure but wide-awake steel officials know that this will be a different story when the excessive demand tapers off and becomes better balanced with steel supplies.

A composite of the views among steel research men definitely indicates the distinct expectation of a severe testing of the present steel price structure. It is also indicated that because of the high labor rates and other cost factors ruinous price cutting may not follow a dropping off in steel demand.

Furthermore most of the views lean to the position that the corrective period expected will precede a normal cycle of good steel production which may last from 2 to 3 years. On the other hand, there appears to be a strong belief that the correction period will not be a matter of a few months but might last as long as a year, during which time steel companies will have concrete evidence as to whether their new and more realistic sales policies can be made to stick.

Antitrust Div. Sets Up Small Business Unit

Washington

• • • **With Chalmers Hamill** designated as its chief, Attorney General Tom C. Clark has announced that the Antitrust Div. of the Dept. of Justice has established a Small Business Unit "to assist small business and the promotion of the free competitive system of private enterprise." The Attorney General said that the department is particularly interested in the problems of veterans seeking to engage in new business or to reestablish enterprises which they abandoned to enter the armed forces.

Assistant Attorney General Berge, in charge of the Antitrust Division, said that each request for assistance is treated in confidence and that it is not necessary that a small business man have proof of a violation of the antitrust laws before he can come to the division with his problems. He added that a letter addressed to the division will suffice to initiate a study of the difficulty and an early determination of what, if anything, can be done in the matter by the Dept. of Justice or by any other agency or department of the government.

Mr. Hamill is a native of Marshall, Ill. He is a lawyer and former manufacturer and was formerly counsel for the Firestone Tire & Rubber Co.

Factors Which May Influence 1947 Steel Output

FAVORABLE

UNSATISFIED DEMAND—Still large numbers of consumers who are and have been unable to obtain household items, cars, etc.

REPLACEMENT—Replacement and maintenance far beyond requirements due to tight supply situation.

BUILDING—Home and industrial building never did get started in a big way due to reconversion tightness in supplies and high black market prices.

EXPORT DEMAND—Rehabilitation and peace treaties are coming along too slow to enable these countries to help themselves meet their demand for some time. Abnormal foreign requirements may continue for from 2 to 3 years.

UNFAVORABLE

PRICES—While there is not too much resentment on the part of steel users, a satisfactory or partial demand may bring about a far more cautious attitude in buying.

INVENTORIES—Greatly unbalanced at present and on overall basis are quite large. Living off inventories for a while could rapidly develop.

ELIMINATED DEMAND—Some projects have been postponed so long that the originators may give up idea entirely. Same situation applies to consumers of household items, furniture, homes and nondurable goods.

GENERAL CONDITIONS—These will have bearing on steel output.

U. S. Asks Court Review of Cement Basing Point Case

Washington

• • • **The Federal Trade** Commission, anxious for a ruling on the legality of basing point systems, on Jan. 21, asked the Supreme Court of the United States for a writ of certiorari in its case against the Cement Institute. This case, which involves the multiple basing point system, was lost by FTC in the Seventh Circuit Court of Appeals at Chicago last fall.

If the writ is granted, the Supreme Court will be given an opportunity to hear the case. FTC has stamped this case as one of the most important in the 30 years of its existence and firmly believes that if the Supreme Court finds in its favor practically all basing point price systems will be outlawed.

During recent weeks, FTC also saw the first practical application of the Supreme Court decisions in the Corn Products Refining Co. and the A. E. Staley Mfg. Co. cases which outlawed the single basing point price system as operated by these companies. The Court upheld the Commission's contention that the single basing point system as used by these companies in the sale of glucose violated the Clayton Act clause (Sec. 2) prohibiting discrimination in price among buyers.

It was also declared that the practice resulted in unearned freight. Legality of the multiple basing point was not considered by the Supreme Court in these cases. The Court some years ago held that the multiple basing point system as operated by the Cement industry did not violate the Sherman Anti-trust. The prevaling case against this industry alleges violation of the Clayton Act.

Application of the court's decision in the Corn Products and Staley cases was seen in the recent action of the United States District Court at Des Moines, Iowa, in the case of the Pure Oil Co., vs L. D. Tucker. The court found for Tucker on the grounds that the oil company was charging for transportation never actually incurred.

Th Pure Oil Co. sued Tucker to foreclose a mortgage. Tucker

FTC Believes Government Win Would Outlaw Almost All Basing Point Prices

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counter-claimed alleging that the company owed him for charges made on transportation not paid for by the Pure Oil Co.

When Tucker made his 5-year contract in 1939 with the company all deliveries were from Oklahoma, to Knoxville, Iowa, pipeline to Des Moines and tank car thence to Knoxville. At that time pipeline rates and rail rates were identical. However, on June 11, 1941 the ICC ordered pipeline rates reduced. Deliveries continued in the same manner, but Tucker in his suit maintained that the company was paying less for pipeline transportation but continuing to charge full rail freight.

In construing the contract, the District Court said:

"Because while there is a delivered tank car price, and the seller has the right to add the price of the transportation, I don't see how it can be other than the actual freight under the provision. He would have the right in fixing up a standard or method that could be used to determine the price to take the place of a stated price in the contract. Otherwise, the seller would have the right to put in for the transportation any price other than that actually to be paid by him. The Pure Oil Co. is not in the business of transportation, and they certainly are not in the business of selling transportation. So they have no right to put transportation in the price at all. That would be an arbitrary matter that was dragged in from the outside."

The Court also ruled that Tucker is entitled to recover all amounts paid in excess of actual transportation charges.

While this finding struck at the so-called "phantom freight" charges the Court did not cite either the Staley or Corn Products cases.

The Pure Oil Co. is preparing an appeal.

NO BASING POINT: *Puzzled spectator symbolizes the problem facing the Superior Court in San Diego, "Where does the roof of a Quonset hut end and the wall begin?" The court must decide whether roof painters, who are entitled to use spray guns, can spray right down to the ground, or whether they must give way to wall painters who are restricted to brushes — and if so where is the line to be drawn?*

MORE TIME: *B. F. Fairless, U. S. Steel president, by the union contract extension will have more time to chart the company's wage and social benefit policy.*

Fairless-Murray Confidence Seen as

Move Posed Problems for Both Steel Company and Union; Accord Acclaimed

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New York

• • • **The mutual confidence** generated between Benjamin F. Fairless, U. S. Steel Corp. president, and Philip Murray, president of United Steel Workers of America, over the past 10 years was probably more responsible than any other factor for the union's agreement with the U. S. Steel proposal to extend the current contracts to Apr. 30.

While the signing of a supplemental agreement carrying the contracts to Apr. 30 might have seemed a simple matter, it posed serious questions for both the company and the union before mutual acceptance. The major reason for the company's proposal was because of extremely uncertain trends in the portal-to-portal pay problem which would affect new wage rates. It is also likely, according to some sources, that the corporation and other steel companies (who were thoroughly acquainted with the request for a contract extension before it was agreed upon by the union) would need time to determine the future trend of steel demand as well as a more clear cut study of net income during the first quarter of this year.

Although it was known (THE IRON AGE, Jan. 23, p. 98) that there was little or no chance of a steel strike because of the attitude between both parties, the extension of current contracts almost assures the industry of a strike-free period this year. From the union standpoint the extension of the contracts was by no means a simple decision to make, according to labor sources.

Mr. Murray's action in recommending to his policy committee that the contracts be extended clearly indicates the union's desire to settle peacefuly, demands which have been made upon the industry. It apparently further indicates that the union is placing great emphasis on its demands for greater social security for its membership. The degree to which it obtains such social benefits will determine to a large extent the actual cents per hour wage increase which will be finally granted.

It is not likely that any particular news will come out of steel wage negotiations over the next several weeks. According to informed sources, discussions will be on strictly non-economic problems. The general outline which both sides had agreed upon before formal negotiations started on Jan. 24 calls for a clarification of the portal-to-portal situation before any serious discussion can be maintained on the size of the wage increase.

Also awaiting a settlement by way of court definition and Congressional legislation on the portal-to-portal issue will be such social demands as, enlarged retirement benefits, severance pay, greater overtime premiums, holiday pay changes and possibly serious negotiations over a guaranteed annual wage.

Although there are many things to talk over and more time in which to talk them over than was at first indicated, both sides have a fairly good idea as to how far they can go in an effort to reach a mutually satisfactory agreement which is now almost a foregone conclusion. Little mentioned but probably due for serious consideration is the establishment of a severance or separation wage adjustment in the U. S. Steel Corp.

Through the leadership of Mr. Fairless since he signed his first contract with Philip Murray 10 years ago, the corporation has gone a long way in improving its employee relations. Due to conditions which were brought to the attention of the top management many years ago by union negotiators and due to a policy within the company of parting company with "old-time" labor practices, the improved working conditions in the industry have taken place at a much faster pace within a given space of time than in probably any other major business enterprise.

Some large companies have had employee benefits for a much longer time and in greater number than the steel industry, but the atmosphere surrounding current steel negotiations seems to indicate, according to some sources, that the U. S. Steel Corp. will spend more and more time and money on the broad question of employee and industrial relations.

While Mr. Murray may not this year realize the fulfillment of his dream of a guaranteed annual wage contract, it will not be because the corporation is not basically sympathetic to the idea or has not made an exhaustive study of its possibilities.

For over the past year the company has utilized all its research resources in an effort to find out if a guaranteed annual wage was possible at this time in the steel industry. A recent summary of this study seems to indicate that present market conditions, employee productivity and the flexible trends in steel output plus the high breakeven point in operations combine to make it impossible to establish a guaranteed annual wage.

It is more than probable, however, that U. S. Steel because of its sincere effort in exploring this problem will by no means close

Major Factor in Contract Extension

Union's Action Appears to Take Strike Threat From The 1947 Steel Picture

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the door and flatly state that a guaranteed annual wage is impossible. There is only the remotest chance that such a plan will be granted through current negotiations and all the weight seems to indicate that further study of the problem combined with attempts for greater stabilization as to sales and to production must be necessary before any final answer can be given.

There is a possibility that the corporation when talking about a guaranteed annual wage as well as other features of the social security programs will point out to the union that such programs would have to have the benefit of a far more effective productivity per employee. It is understood that a decline in output of 25 to 30 pct of operations would make impossible even an extremely modified guaranteed annual wage program. This is said to be especially true in view of the uncertainty in the volume of steel sales during the latter part of this year.

One thing appears certain because of the contract extension, according to observers—both sides will know far more about each other's future outlook over the next few months than they know now and it is on that basis that both sides hope to build a lasting and mutual contract without resort to small mindedness or expediency.

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Pittsburgh

• • • **Coming with** unexpected suddenness but nevertheless emphasizing the desire of both the steel industry and the CIO to avoid a steel strike, the U. S. Steel Corp. contract with the CIO-USWA was extended by mutual agreement until Apr. 30, 1947. At the same time, the U. S. Steel Corp. announced that its five principal steel-producing subsidiaries have concluded agreements with the CIO-USWA "on substantial and basic parts of a program involving correction of intra and inter-plant and inter-company wage inequities." Under the agreements, more than 25,000 widely varied steel mill jobs are grouped into 30 labor classifications, with proper relationships established between the respective wage rates for these various classifications. The resultant wage scale will consist of 30 standard hourly wage rates ranging up to $1.98 per hr in classification No. 30 in all plants in which the common labor rate is now 96½¢ an hr.

In the first conference on Jan. 24 with the negotiating committee of the union, U. S. Steel representatives proposed that the labor agreement that terminates on Feb. 15, be extended until Apr. 30, in order to provide additional time to conduct effectively collective bargaining on the terms and conditions of the new contract. B. F. Fairless, U. S. Steel Corp. president, stated that the union accepted the proposal, because of the desire on the part of both parties to make a contribution to national welfare.

In November 1944 the National War Labor Board directed U. S. Steel subsidiaries and the union to negotiate wage scales to eliminate alleged intra-plant wage rate inequities, the adjustments to be retroactive to Jan. 4, 1944. On May 8, 1946, these companies and the union agreed that the cost of the intra-plant adjustments would be limited to an average of 3⅝¢ per employee-hr, using the third quarter of 1943 as the base reference payroll period. The contracts just signed put that understanding into effect and provide for retroactive payments in excess of $30,000,000. The agreements also provide for the elimination as to the future of inter-company wage inequities which were not embraced in the directive of the War Labor Board.

The effect of the elimination of inter-company wage inequities is the equivalent of a 1½¢ hourly wage increase to a large percentage of the companies' steel workers. Employees who benefit from the upward revision in wage scales will receive retroactively, for all time worked since Jan. 4, 1944, 70 pct of the total hourly adjustment which will be applicable to them in the future.

The new standard wage scale is scheduled to become effective in the first pay period beginning after Jan. 31, 1947, and the retroactive payments are to be made in lump sums to individual employees as soon as practicable.

Following establishment of the standard hourly wage scales, the companies will commence the next phase of the program, involving review and revision of existing incentive wage plans to bring them into conformity with the principles of the agreements negotiated.

DIFFICULT DECISION: *Philip Murray's USWA proved by okaying U. S. Steel's extension proposal that it wants no industrial strife.*

To Limit Royalty Base For Premium Payments

Washington

• • • **Revision of the** regulations governing the payment of premium prices for copper, lead and zinc to prevent undue diversion of subsidy money into royalty payments has been announced by Commissioner Harold Stein of OWMR.

Under the amended regulations, effective immediately, approval will not be given for a royalty rate for any operation which exceeds the rate prevailing Nov. 10, 1946, when MPR 356 was revoked.

Big Steel Proposal Asks Higher Output; Ban on Union Shop

Pittsburgh

• • • **A fair day's work** for a fair day's pay is one of the principal conditions required by the steel producing subsidiaries of U. S. Steel Corp. in proposals made to the United Steelworkers of America on Jan. 27 for a new labor agreement. In addition to insisting upon greater productivity of the workers, these U. S. Steel subsidiaries notified the union that they would insist that an employee have the fundamental right to determine for himself, free from intimidation, coercion or discrimination from any source, whether or not to become or to continue to be a member of the union.

The proposals were presented to the union at the second collective bargaining conference between the union and U. S. Steel subsidiaries held Monday at the William Penn Hotel in Pittsburgh, Pa. The U. S. Steel subsidiaries which presented the proposals to the union are: The American Steel and Wire Co., Carnegie-Illinois Steel Corp., Columbia Steel Co., Geneva Steel Co., National Tube Co., and Tennessee Coal, Iron and R.R. Co.

U. S. Steel's proposals dealt almost exclusively with non-economic or non-cost matters because of the agreement reached at the first conference last week when the present labor contracts were extended until April 30, 1947, by which time it is hoped that the existing portal-to-portal confusion will have been clarified by legislation or further court decisions. The only reference to purely cost aspects was contained in a proposal that the wage-cost considerations of a new agreement shall be regulated by the long-term best interests of the employees, the owners and the public, and shall be minimized by maximum performance of the employee.

The proposals make clear that the companies are insistent upon retaining full management control over hiring, termination of employment, wage incentives, maintenance of discipline and similar activities. U. S. Steel further proposes that the parties be bound by a no strike-no lockout pledge, by penalties for failure to live up to the agreement and by compulsory arbitration of grievances arising under the contract with the functions of the arbitrator limited to determinations involving interpretation, application or compliance with the provisions of the contract.

Some of the provisions proposed are expressed or implied by the language of the present labor agreement. These steel companies believe, however, that the new agreement should contain clearer statements and more logical arrangements of the conditions so as to minimize possibility of erroneous interpretations and in order to facilitate administration of the agreement in the plants as well as in arbitration.

Directs CPA to Obtain Output of 65,000 Tons Of Tinplate for Export

Washington

• • • **The controversy** over continuation of the tin plate export program has been resolved by Presidential Adviser John R. Steelman, who, on Jan. 24, directed CPA to reach agreements with tinplate producers for the production of 65,000 tons for export beginning Apr. 1. (THE IRON AGE, Jan. 9, p. 104). This tonnage is part of a preliminary second quarter program. For the first quarter there was a 55,000 ton advance allotment approved last fall and a carryover of 75,000 tons from the fourth quarter of 1946, making a total of 195,000 tons for the first 5 months of the year. The Office of International Trade had requested an allocation of 156,000 tons in addition to the advance allotment and the carryover. This request was pared to 65,000 tons by CPA, the figure finally approved by Mr. Steelman.

OIT and the State Dept. hoped to get about 12,000 tons of this final allocation during March but this was opposed by CPA on the grounds that it would disrupt mill schedules and create a shortage during that month among domestic users.

Therefore, Mr. Steelman ordered CPA not to issue directives calling for delivery of the 12,000 tons in March. Instead it was ordered that CPA reach an agreement with the industry to deliver this tonnage during the first two weeks of April. It is hoped to split delivery of the 65,000 tons between the months of April and May—40,000 tons during April and the remainder in May.

CPA officials also predict that the 65,000 tons allotment will be the last government supported program for the export of tinplate.

The Stag at Bay

Washington

• • • **"It is a dull week indeed at War Assets when we are not hit by a 36-page report, of which 35 pages are devoted to our incompetence and one page to saying that maybe we mean well. It is even rarer when we do not find ourselves blasted on the radio, cartooned in the politically-minded papers, or stripped of our rags of self respect by the columnists.**

"I doubt if any government agency, other than WPA, OPA or OWI, ever enjoyed more widespread concern for its deliquencies than WAA. I am not minimizing the benefits that have followed this generous castigation, nor am I dismissing them as altogether unearned and unwarranted. This is still a free country where we cherish our right to cast our ballot for a man today and to denounce him tomorrow as an unmitigated scoundrel for whom hanging would be too good. I shall not attempt here to answer any of the indictments laid at our door because the figures themselves best tell the story."

—Robert McGowan Littlejohn, WAA Administrator.

Before the U. S. Conference of Mayors, Jan. 21, 1947.

Weekly Gallup Polls . . .

Little Sympathy Shown for Closed Shop Principle

Princeton, N. J.

• • • **Union leaders** trying to ward off labor control legislation in the new Congress face one serious handicap so far as public opinion is concerned, according to George Gallup, director, American Institute of Public Opinion.

Many of the most fundamental policies and beliefs of organized labor have never been generally accepted by the public. The closed shop is one of the most notable examples.

Senator Ball's bill to restrict the closed shop has met with furious union opposition, and difficult sailing has been predicted for it in Congress. Yet the fact is that only one voter in twelve throughout the country approves the principle of the closed shop. Only one in four favors either the closed or the union shop.

The majority express themselves in favor of the open shop.

Labor's failure to enlist public backing for so fundamental a policy as the closed shop has had many repercussions. For one thing, it has undoubtedly at times caused the public to be unsympathetic towards strikes called to enforce compulsory union membership.

The test of public sentiment on the closed shop was made by the institute with the use of this question:

"Which one of the three types of shop do you prefer—the closed shop, the union shop, the open shop?"

Each type of shop was explained to the people interviewed with the use of a card, as follows:

(1) The closed shop—requiring every worker in a company to belong to a union before he can be hired.

(2) The union shop—requiring every worker in a company where there is a union to join that union after he is hired.

(3) The open shop—not requiring any worker to join a union, but letting each one decide whether or not to join.

The results:

	Pct
Favor closed shop	8
Favor union shop	18
Favor open shop	66
No opinion	8

Among union members polled in the survey the majority preferred the closed or union shop to the open shop. However, the preference is not marked, being in the ratio of five-to-four.

The preferences among various occupational groups and union members are shown below:

	Closed Pct	Union Pct	Open Pct	No Opin. Pct
Prof. & Bus...	7	14	73	6
Farmers	3	11	78	8
White Collar	6	17	69	8
Manual Workers ..	11	23	56	10
Union Members .	19	33	41	7

In both Britain and Canada the issue of compulsory union membership has also been put to the public in recent weeks.

In both countries the weight of opinion was found favoring the open shop principle.

The Canadian question with results:

"In a factory which has a union, should the workers who are not members be free to stay out of the union if they are getting union rates of pay?"

The vote:

	Pct
Workers should be free to stay out....	45
Should not be free	34
No opinion	21

The British question with results:

"Several organizations have said they will apply the closed shop, which means that all workmen must belong to one union. Do you approve or disapprove?"

	Pct
Approve	32
Disapprove	44
No opinion	24

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• • • **Speaking in terms** of majority opinion, the American people don't expect much in the way of price relief in the next 6 months.

Such is the evidence from a nationwide survey recently completed by the institute.

Food prices are an exception to the general trend. About as many persons expect food prices

Majority Not Expecting Price Drops Within Next 6 Months; No Depression Foreseen in 1947

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to drop as expect them to remain the same or go higher.

But, aside from food, majorities say they feel that prices will either remain stationary or go up within the next half year on a selected list of basic goods and services about which field reporters questioned them.

The question in the survey:

"Do you think that prices on the following items will be higher, lower, or about the same 6 months from now?"

	Higher or About Same Pct	Lower Pct	No Opin. Pct
Food	46	48	6
Rent	83	13	4
Clothing	55	38	7
Automobiles	70	19	11
Mfg'd Goods—radios, refrigerators	65	30	5
Real estate	56	37	7

College people, however, are more inclined to look for price drops on food, clothing, and manufactured goods than voters in other educational groups or the total voting population. Men and women show no marked differences in their thinking on the question.

A further breakdown of the findings brings out some other interesting facts. Limiting the analysis to the people who don't think prices are going down—that is, those who say prices will remain the same, or go up:

(1) More of the people included in the survey think rents are going to increase than think they are going to stay where they are. The same holds true for thinking about automobile prices, and for the prices of manufactured goods such as radios and refrigerators. Public opinion may be conditioned here by repeated assertions that new wage demands are in the offing in industry and that if wage increases occur, price increases must follow.

(2) On food, clothing, and real

(CONTINUED ON PAGE 151)

Shortages Cut 1947 Cold-Rolled Steel Expansion Plans

B. S. Chapple, Jr.

But Steel Official Predicts 17 Million Tons of Sheet And Strip for 1947

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Memphis, Tenn.

• • • **An estimated 17 million** tons of steel sheets and strip should be available in 1947, according to Bennett S. Chapple, Jr., assistant to the vice president, sales, U. S. Steel Corp. Mr. Chapple made his forecast in an address delivered here before the annual convention of the Truck-Trailer Manufacturers Assn. He also asserted that relaxation of current demand already has dictated a transposition from a sellers' market to a buyers' market.

Actual output of sheet and strip in 1946 was 14 million tons, or 2 million less than the 1941 figure. Steel industry plans call for an eventual expansion of production to 19 million tons—20 pct over the 1941 figure, Mr. Chapple declared. But he indicated that actual production during the current year would reach only 17 million tons as a result of interruptions.

Mr. Chapple said that even before the war the steel industry had planned expansion for flat rolled products. "When all these new facilities actually come into production, it is estimated that the steel industry's sheet and strip capacity will be stepped up to approximately 19 million tons, a 20-pct increase over the 1941 peak output" he said.

"Original plans called for most of these facilities to be in and operating by the end of 1947, with several of them actually in production early this year," he continued. "Many difficulties, however, have been encountered which have made this impossible. The most serious delaying factor has been the difficulty in getting delivery of electrical equipment and motors as a direct result of the prolonged strikes and the material shortages which General Electric, Westinghouse, and Allis-Chalmers have all had to face during the past year.

"Latest estimates as to when these planned facilities will be in and running now extend well into 1948. However, in spite of this and based upon the expectation that at least some of the planned new facilities will come into at least partial operation during the latter months of this year, it is now estimated that something over 17 million tons of sheets and strip should be available in 1947.

"In addition to the tonnage expansion planned, you will be pleased to know that the production turned out will be much more nearly related to market demand since most of the expansion is devoted to stepping up cold-rolled production."

Mr. Chapple qualified his remarks with several warning notes. He pointed out that his opinion and forecasts were predicated on an assumption that there will be no further strikes or other work stoppages. Forecasting more sheet and strip for the truck-trailer industry this year, he also said "it is important for all of us to recognize that your industry by itself is not the only customer the steel industry has for sheets and strip." In that connection he cited the demand from makers of automobiles and trucks, household appliances, housing and other consumers. In reference to the housing program, he said the Civilian Production Administration in the past has exercised authority to issue priorities, and added "there is no reason to feel that as long as this agency is in existence this same technique will not continue to be employed when needed." Other demands, he said, arise from the farm machinery field and from export needs determined by the State Dept. for world security reasons.

Despite his warnings against undue optimism, Mr. Chapple declared "there are encouraging signs on the horizon." He said there is evidence that pent-up demand created by wartime shortages is being satisfied. He concluded that certainly by the end of this year, and possibly before, many products will have come into proper supply-demand balance.

Enamel Product Output Good

Chicago

• • • **Only shortages of** steel and other basic materials in 1946 prevented production of porcelain enamel products from far outstripping the industry's former record peacetime year 1941, according to Edward Mackasek, managing director of the Porcelain Enamel Institute.

Estimating from industry reports for the first 11 months of 1946, Mr. Mackasek said that shipments of porcelain enameled products for the year would equal and probably exceed the 1941 record despite operating obstacles. Achievement of this record, in the face of hampering shortages, combined with greatly broadened markets for porcelain enamel, indicates that any slight improvement in basic material supplies will make 1947 the porcelain enamel industry's biggest year.

Latest Engineering Achievements Described at SAE Meeting

Detroit

• • • **With military subjects** in the background for the first time in 4 years the 1947 annual meeting of the Society of Automotive Engineers held at the Book Cadillac Hotel recently attracted more than 5000 persons to the 30 sessions comprising the mid-winter program.

Automotive engineers who attended the meetings were offered a comprehensive program which included 63 technical papers describing the latest engineering developments on aircraft, aircraft power plants, diesel engines, fuels and lubricants, passenger cars, passenger car bodies, tractors, farm machinery and motor trucks and buses.

In addition to reports of technical advancements by the automotive and aircraft industries, SAE members heard a strong plea by Maj. Gen. L. C. Craigie, Chief, Engineering Div., Air Materiel Command for a $250 million annual appropriation to support the AAF peacetime research and development program.

W. Averill Harriman, Secretary of Commerce, was the featured speaker at the annual dinner held at Detroit's Masonic Temple. In developing this subject, "Free Enterprise and the Future," Mr. Harriman pointed out that no one can tell how far the present experiments in socialization in Europe will go. What Europeans have heard about our price inflation and major strikes has only added to their concern about the future of this country, he said.

Toastmaster for the annual dinner was Paul G. Hoffman, president of Studebaker Corp. with L. Ray Buckendale, president of SAE and C. E. Frudden, president elect of SAE, also participating in the program.

Speaking at an aircraft powerplant session, G. M. Lange of Ex-Cell-O Corp., Detroit, recommended the use of fuel injection systems to replace carburetors on light aircraft. Among the advantages of fuel injection systems, the speaker said, are elimination of manifold icing, lower cylinder-head temperatures, better fuel economy, increased horsepower and longer engine life. Mr. Lange added that the intake metering injection system solves two difficult problems—compact engine design and cost—and also increases the utility and reliability of the personal plane.

Over 5000 Attend Program At Which 63 Technical Papers Were Heard

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Jay A. Bolt of Bendix products division, Bendix Aviation Corp., South Bend, Ind., described a new speed-density system of fuel metering for aircraft in which the engine itself becomes an air meter, replacing the standard carburetor venturii system. Fuel is metered in response to variations in engine speed, intake manifold pressure and temperature, and exhaust back pressure with resulting consistent fuel consumption in flight, better flight instrumentation and a reduction in size and weight.

The use of electrical energy dissipators to supplement wheel brakes will permit larger loads to be moved faster with greater safety on commercial vehicles according to J. G. Oetzel of Warner Electric Brake Mfg. Co., Beloit, Wis. Cut in by the operator, the dissipator creates a resistant electric field which exerts a braking action and simultaneously releases heat, thereby reducing wear on the wheel brakes and retarding the speed of the vehicle.

The development of 2-way radio telephone equipment has now reached a point where selective calling methods direct code signals to specific vehicles and their operators. Wesley G. Baylis of New York Power & Light Corp., Albany, reported that such systems are already available for commercial motor fleets and that signals can be coded so they will be received only by specific vehicles and drivers.

Coordinated effort by metallurgical, engineering and materials specification departments to make structures stronger by making them lighter will be rewarded in the form of simpler structures that are easier to handle, fabricate, assemble and maintain, Francis G. Tatnall, of Baldwin Locomotive Works, Eddystone, Pa., told a materials session. With metallurgists utilizing modern scientific instruments for the selection of materials, plus intelligent interpretation of masses of data assembled by engineers as a result of carefully made static and dynamic measurements, plus performance testing and measurement of service loads by the field staff, savings of weight up to 30 pct have been achieved, the speaker said, with an almost equal saving in cost due to product simplification.

"If labor demands a greater share of the customers' dollars, and the customer balks at paying more," Mr. Tatnall explained, "there is only one unexplored possibility to relieve some of the stress—savings through design improvement."

Crankshaft bending failures in service can be prevented by proper instrumentation of engine and propeller prior to use, according to E. Forest Critchlow, CAA, Washington, D. C. and W. T. Bean, Jr., Continental Aviation & Engineering Corp., Detroit. The authors' paper was presented at an aircraft powerplant session.

Recent development of automotive cements and sealers was described by Allan J. Carter of Chrysler Corp., Detroit.

The use of independent suspension on both axles of the family passenger car was predicted by Reid A. Railton of Berkeley Calif., consulting engineer and designer of racing cars. Mr. Railton explained that independent suspension on both axles has been used on racing cars to give improved road holding characteristics. "It will probably become universal on all automobiles because of the increased safety and comfort," he said.

Paul Klotsch of Crosley Motors, Inc., Cincinnati, described the design and development of a 4-cylinder automobile engine fabricated from steel stampings, steel tubing and screw machine parts. The engine weighs 120 lb with accessories, and produces better than 26 hp at 5200 rpm. Installed in the Crosley car, Mr. Klotsch said, the engine gives 50 miles per gal of gasoline at 30 mph. Mr. Klotsch described

the historical development of this overhead camshaft type engine and explained that the 125 pieces comprising the cylinder block are copper brazed in a 60 ft furnace at 2060°F.

The Skinner slide-valve engine was discussed by its inventor Ralph L. Skinner of Skinner Motors, Inc., Detroit. Among the advantages claimed for this engine are elimination of poppet valves, power-weight ratio of one to four and the possibility of reducing car weights by as much as 800 lb. The engine will operate on low octane fuels, gives better performance and economy, and eliminates troublesome "hot spots," according to Mr. Skinner.

H. E. Fox, of General Motors truck and coach division, explained how instruments are being used to measure structure loads and stresses on motor coaches. Utilizing a technique borrowed from aircraft engineering, technical data developed will be used to supplement observations obtained from Belgian block road-testing, the author said.

Methods used to produce body panels, bumpers, fenders and other parts, now made from steel, by employing sandwich construction plastic laminates were described by Fred B. Stanley of New York. Present applications of plastic by the automotive industry including the development by Briggs Mfg. Co., of decorative laminates for car interiors were described.

David R. Pearl of Hamilton standard propellers division, United Aircraft Corp., East Hartford, Conn., reported that a new synthetic rubber O-ring or "doughnut" seal has been developed which can be made leakproof with static pistons and cylinders and satisfactorily leakproof with reciprocating pistons and cylinders for fluid pressures up to 5000 psi and temperatures between 60°F below zero and 250°F above zero.

A. Dolinsky and F. W. Disch of Boeing Aircraft Co., Seattle, recommended a study of the effect of extremes of temperature, moisture, humidity, dust, sand and ice on the operation of turbine and jet-propelled aircraft.

Pointing out that fuel systems of reciprocating engines are by comparison relatively simple W. H. Curtis and P. J. Lansing, of Thompson Products, Inc., Inglewood, Calif., reported that the design and development of fuel systems for turbo-jet and turbo-propeller aircraft have become major tasks which will require a great deal of engineering study.

A suggestion that greater consideration to engineering details such as valve seat distortion, valve cooling and matching of cam design and engine performance came from Vincent C. Young of Wilcox-Rich division, Eaton Mfg. Co., Detroit.

Errol J. Gay and Henry T. Mueller of technical service department, Ethyl Corp., Detroit, told a truck and bus session that road and dynamometer tests with actual engine and fuel are preferable to laboratory test data in selecting the fuel which operates best in an engine.

Two methods of heating and ventilating passenger cars were described in detail by Lewis A. Rodert of National Advisory Committee for Aeronautics, Cleveland. Mr. Rodert proposed the use of heating and ventilating techniques now employed on aircraft for land vehicles. One system proposed calls for use of an intake scoop, pass through filter and heater and subsequent flow through the side panels. A second system has the heater mounted at the rear of the car, forcing air from vents downward over the windows and through floor vents.

A great deal of interest was shown in the paper by W. D. Appel of Willys-Overland Motors, Inc., Toledo, who asserted really lightweight vehicles can be built if the aesthetic takes second place to the functional. The steps suggested by Mr. Appel included making the vehicle smaller, eliminating all unnecessary parts, simplifying design to eliminate machining operations and combining several functions in a single part. He also urged design for higher stresses and the application of light metal alloys.

"If we are to provide transportation in which the cost of the vehicle, as well as operation and maintenance, falls within the means of millions in this country, Mr. Appel asserted, "we must build lighter, more efficient and more economical cars."

Individual rear wheel suspension promises new riding comfort possibilities for motor vehicles used off city streets, said Austin M. Wolf, consulting engineer of New York, but involves higher first costs, wear factors and maintenance.

Domestic manufacture of synthetic rubber is essential, J. E. Hale of the Firestone Tire & Rubber Co., Akron, Ohio, warned if this country is to maintain an adequate supply and is not to be at the mercy of other countries as regards supplies and prices. Mr. Hale believes that further scientific research will result in synthetic tires, tubes and other rubber products equal, if not superior, to those made of natural rubber.

William Weitzen and Robert G.

NOT THE RUSSIAN FRONT: *Men of the 9th Field Artillery Bn stand by a 4.5-in rocket launcher during Alaskan maneuvers of Task Force Frigid. Cold weather tests of men and equipment of this force stationed at Ladd Field, Alaska, will continue until April* 30.

Dunn of Air Materiel Command, Wright Field, Dayton, Ohio, proposed that aircraft power plants incorporate better priming systems and faster cranking speeds to facilitate starting in cold weather. Military aircraft must be ready to fly regardless of temperature and starts must be made with certainty in 1 to 3 min at temperatures down to 65° below zero, the authors said.

Smoking diesel engines are an unnecessary evil which can be eliminated by keeping engines in good repair, operating on good fuels and by preventing overloads, Prof. P. H. Schweitzer of Pennsylvania State College, assured the diesel engine section.

Other papers included on the midwinter program were: Scuff and Wear Resistant Chemical Coatings by F. C. Young and B. B. Davis, Ford Motor Co.; Manufacture of Precision Castings by Gosta Vennerholm and E. E. Ensign, Ford Motor Co.; Superchargers for Gasoline Engines by R. L. Weider, White Motor Co.; The Trend In Combustion Chambers and Fuel Systems by A. T. Colwell, Thompson Products, Inc. and Alex Taub, consulting engineer; and Mean Specific Heats for the Working Media of Gas Turbine Powerplants by N. A. Hall, United Aircraft Corp.; Stresses in Rotating Discs by Radius of Curvature Integration by C. M. McDowell, of Packard Motor Car Co.; NACA Study of Measurement of Piston-Ring Radial-Pressure Distribution by M. C. Shaw, C. D. Strang and O. W. Hart, National Advisory Committee for Aeronautics; Analysis of Positive Supercharger Losses by R. J. S. Piggott, Gulf Research & Development Co.; Cold Starting Characteristics of the Cyclone Engine by G. A. Bleyle, Wright Aeronautical Corp.; Crawler Tractor Performance with Hydraulic Torque Converter Drive by A. H. Deimel, Spicer manufacturing division, Dana Corp.; Design Features of the North American Navion by S. C. Hellman and Ed Schmued, North American Aviation, Inc.; and Engine Trouble Shooting in the Air, by John Lindberg, Pan American Airways, Inc., and Clifford Sackett, Lindberg Instrument Co.

Symposiums on Light-Weight Sandwich Construction, Instrumentation and Future Developments in Air Transportation were also included in the program.

C. E. Frudden of the tractor division, Allis-Chalmers Mfg. Co., Milwaukee, was elected 1947 president of SAE. He succeeds L. Ray Buckendale of Timken-Detroit Axle Co., Detroit, who served during 1946.

The following SAE vice-presidents were elected: Air transport, Harold R. Harris of American Overseas Airlines, Inc., New York; aircraft, James M. Shoemaker, of Chance Vought Aircraft Div., United Aircraft Corp., Stratford, Conn.; aircraft powerplant, Carl T. Doman, of Aircooled Motors, Inc., Syracuse, N. Y.; body, Rudolph I. Schonitzer, of Schonitzer Engineering Co., Cleveland and diesel engine, George M. Lange, of fuel injection division, Ex-Cell-O. Corp., Detroit.

Fuels and lubricants, John M. Campbell, of research laboratories, division, General Motors Corp., Detroit; passenger car, W. H. Graves, of Packard Motor Car Co. Detroit; production, Stephen Johnson, Jr., of Bendix-Westinghouse Automotive Air Brake Co., Elyria, Ohio; tractor and farm machinery, B. G. Van Zee, of automotive division, Minneapolis Moline Power Implement Co., Minneapolis; transportation and maintenance, D. K. Wilson, of New York Power & Light Corp., Albany; and truck and bus, Schuyler A. Jeffries, of the Studebaker Corp., South Bend, Ind.

B. B. Bachman, of Autocar Co., Ardmore, Pa., was reelected treasurer. Three new members of the SAE council for 1947-48 were elected as follows:

Marcus L. Brown, Jr., of Seiberling Rubber Co. of Canada, Ltd., Toronto, Ont.; Elmer McCormick, of John Deere Tractor Co., Waterloo, Iowa; and Charles H. Miller, of White Motor Co., Cleveland.

An SAE life membership was presented to SAE past president W. S. James, of Ford Motor Co.

Directors Added to Board

Detroit

• • • **Five new directors** have been elected to the 15-man board of Automotive & Aviation Parts Manufacturers, Inc. They are: Wendell W. Anderson, president of Bundy Tubing Co., Detroit; Robert H. Daisley, vice-president of Eaton Mfg. Co., Detroit; F. C. Greenhill, president of Acklin Stamping Co., Toledo; K. J. Ammerman, assistant to the president, Borg-Warner Corp., Chicago; and Clarence C. Carlton, vice-president and secretary of Motor Wheel Corp., Lansing, Mich.

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TOWER TOWED: *One of the largest shop fabricated steel vessels ever fabricated is this fractioning tower for a fluid catalytic cracking plant. Too large for rail or road transport it had to be towed from Milwaukee across Lake Michigan to Whiting, Ind., where it will be set up. Weighing* 155 *tons, it is* 108-*ft long and* 16 *ft* 2 *in. in diam.*

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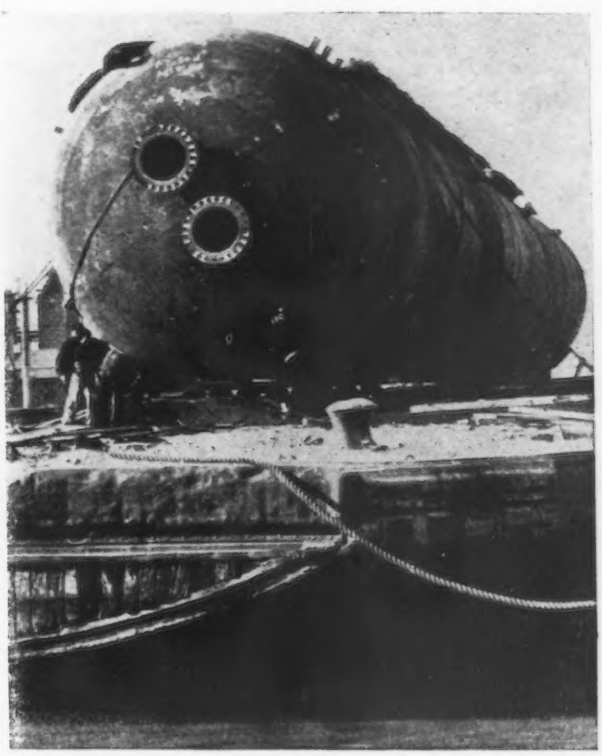

Improved Design Of Reinforcing Concrete Bars Now Under Way

Washington

• • • **The prime** objectives of the research program on reinforced concrete now under way at the National Bureau of Standards by a fellowship of the American Iron & Steel Institute are improved design of concrete reinforcing bars and engineering data that will enable engineers and builders to make more effective use of reinforced concrete.

Reinforced concrete is essentially concrete into which reinforcing materials, usually steel bars, have been incorporated to give added strength. A mechanical bond—that is, a bond which will resist slipping of the bar within the concrete—is set up between the reinforcement and concrete, and the effectiveness of the reinforcement is dependent on this bond. The investigations by the fellowship constitute fundamental research into the mechanism of this bond, and the factors that affect the bond strength between the concrete and the reinforcing bars.

Reinforcing bars, with ribs or ridges of various patterns, are known as deformed bars, and as many as 20 designs of these bars are commercially available. Although it is generally recognized in the industry that some of these are more effective in developing bond than others, minimum requirements for deformed bars have not been established. One purpose of this investigation is to set up criteria that will define a satisfactory deformed concrete reinforcing bar and eliminate the less effective of these designs. On the basis of preliminary data, the members of the American Iron & Steel Institute who are producers of reinforcing bars have discarded from further consideration all but five designs.

The test procedure for determining relative bond efficiency, prepared through the cooperation of a committee of the American Concrete Institute, of which H. J. Gilkey is chairman, has been published as a proposed standard of the American Concrete Institute. Taking into account the many factors that affect the character of the bond, specifications cover the composition and quality of the concrete, the location and length of embedment of the bars in the concrete, construction of the molds and assemblies, details of casting and curing, and methods of testing the finished specimen. Test specimens are beams 6-½ ft long, 1-½ ft high, and 8 in. wide. For this series of tests nominal ⅞-in. bars, the most commonly used size, have been specified. It is anticipated that other sizes will be tested later.

The fellowship at the Bureau of Standards, one of several supported by the American Iron & Steel Institute at various institutions, operates under the Bureau's research fellowship plan. According to this plan, groups or organizations whose research programs fall in fields within the Bureau's scope of activities may be permitted, under certain conditions, to establish research fellowships for investigation of problems of mutual interest in these fields. Such fellowships are granted the complete facilities of the Bureau's laboratories and results of their work are made available in the same manner as those of other Bureau laboratories. Known as research associates, their personnel are accorded all privileges of Bureau employees.

Established in 1944, the American Iron & Steel Institute fellowship consists of five employees, under the immediate supervision of Arthur P. Clark, research associate, formerly of the Bethlehem Steel Co. Along with other research projects on reinforced concrete conducted by the institute, the work of the fellowship is planned and directed by the institute's committee on reinforced concrete research. Roy R. Zipprodt is research engineer for the committee.

Laboratory facilities and equipment have been provided by the Bureau's Masonry Construction Section, with which the work of the fellowship is closely associated. The fellowship is now undertaking more exhaustive bond tests with seven varieties of bars, including the five indicated by the preliminary tests to be most desirable from all standpoints. Data from these tests will provide the industry with information that will permit them to develop better deformed bars. The results of the preliminary tests, however, have indicated desirable modifications in design, some of which have already been put into effect.

Coming Events

Feb. 13-14 First National Ordnance Gage Conference, Lehigh University, Bethlehem, Pa.
Feb. 17 Chicago World Trade Conference, Chicago.
Mar. 2-5 American Society of Mechanical Engineers, spring meeting, Tulsa, Okla.
Mar. 6-8 National Assn. of Foremen, annual national conference of educational directors in industry, Cleveland.
Mar. 17 American Institute of Mining & Metallurgical Engineers, world conference on mineral resources, New York.
Mar. 17-19 American Society of Lubrication Engineers, annual meeting, Pittsburgh.
Mar. 17-19 American Gas Assn., sales conference, Boston.
Mar. 17-19 Chicago Technical Societies Council, production conference, Chicago.
Mar. 19-22 American Society of Tool Engineers, annual meeting, Houston.
Mar. 22 Western Metal Conference and Exposition, American Society for Metals, Oakland, Calif.
Mar. 31-Apr. 2 Midwest Power Conference, Chicago.
Apr. 7 Packaging Machinery Manufacturers Institute, semiannual meeting, Philadelphia.
Apr. 7-10 National Assn. of Corrosion Engineers, convention, Chicago.
Apr. 8-11 American Management Assn., packaging exposition, Philadelphia.
Apr. 29-May 1 Industrial Packaging and Materials Handling Exposition, Industrial Packaging Engineers Assn. of America, Chicago.
May 15-17 Society for Experimental Stress Analysis, annual meeting, Chicago.
June 16-20 American Society for Testing Materials, annual meeting, Atlantic City, N. J.

The London ECONOMIST

The Shadow of Lenin

Reprinted by special permission to further understanding on how political and economic affairs are viewed in London.

FOR several months now purges have been reported from Russia. Collective farms, party organizations, associations of authors, the theatre, the film—nearly every field of activity is subjected to a close ideological scrutiny. The results are summed up in resolutions of the Central Committee of the Communist Party.

Recently Mr. Zhdanov, member of the Politbureau, actual governor of Leningrad and chairman of the Control Commission for Finland, startled Soviet opinion with his detailed and strongly-worded criticisms of a group of Leningrad writers, Zoschenko, Akhmatova, Tikhonov and others. The attack was supported by a long-winded and solemn resolution of the Central Committee which sounded more than a little incongruous in view of the relative unimportance of the criticized authors. Yet for weeks on end the editorials of the whole Soviet press, from *Pravda* to the remotest village sheet, have been chewing upon Mr. Zhdanov's literary exorcisms, as if they were some world-shaking event. To crown the incongruity of the situation, some of the men so severely reprimanded soon appeared on the Soviet list of honors as recipients of the Order of Lenin.

These confusing reports have given rise to rumors about some political crisis, rumors that were soon magnified into stories of internal collapse and dissolution in Russia. Some of those who have remembered the bloody purges of the late thirties have thought that something similar has been happening now.

However, the analogy with the thirties is altogether misleading. The Soviet political scene is in many respects very different at present from what it was 10 years ago. Then the Stalin regime was not yet finally established. Bukharin, Rykov, Zinoviev, Kamienev and, above all, Trotsky were still actual or potential pretenders to revolutionary power. In the past, almost every one of those leaders was more prominent and popular than Stalin himself. Each faction of the opposition had enough brains and talent to be able to form an alternative government; and a bloc of all these factions would have certainly overshadowed the personnel of the ruling group.

It can now be only guessed in retrospect that if the purges of the thirties had not taken place Stalin's leadership would probably not have gone unchallenged, as it did, in the years 1941-42, during the period of Russia's military retreats and reverses. The purges, massive and comprehensive, removed from the scene all the groups from which an alternative Soviet government might have sprung in the years of the supreme test.

THE revolution, like Saturn, devours its children. But it cannot repeat the horrible feast when its children are no longer. The present purges are therefore quite different in character from those of the thirties. They are not part of any struggle for power. Indeed, their immediate political purposes are so vague and their methods so mild as to make even the use in this context of that pregnant word "purge" somewhat doubtful.

Even so, the campaign of the recent months has had considerable significance as a symptom not of any actual crisis, let alone of any crumbling of the regime, but of certain trends and undercurrents that are wrestling with each other under the outwardly uniform surface of the regime. The campaign can perhaps best be described as something like a Leninist revivalism, an effort to recall to the mind of the young Russian generation some of the tenets and canons that were formulated partly by Lenin and even more so by Stalin himself in the middle twenties.

The events of the last decade or so have undoubtedly done much to eclipse that earlier party tradition. The once powerful fervor for the party, its ideals and program, was strongly damped by the spectacle of the thirties in which most of the great leaders of the party were denounced as traitors and foreign agents. In revolutionary France,

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Jacobinism itself was killed for good in the mutual slaughter of the various Jacobin factions. In Russia, the slaughter of the various Bolshevik factions did not kill Bolshevism, but it did certainly maim it, as a creed or a doctrine if not as an organization. What remained of the old "Bolshevik consciousness" in the mind of the people was later—in the years of the war—heavily overlaid by nationalist moods, deliberately encouraged in the interests of defense.

The Government, in its propaganda and educational policy, has never explicitly acknowledged the existence of any contradiction or conflict between these ideological trends. But it has certainly been aware of it, and it has been uneasy about where this continuous evaporating of the Communist ideology and the upsurge of quasi-nationalist moods might lead in the end.

The campaign of the last few months has strongly reflected that uneasiness. Most of the paraphernalia of Russian patriotism, which was so much in evidence during the war, has been discreetly but persistently removed from the official stage. Those who in recent years have taken the glorification of the Tsarist past too seriously are now castigated and reminded that Soviet, rather than Russian, patriotism is the order of the day.

The Central Committee of the party, a body that was hardly mentioned over many years, has regained prominence and decrees and resolutions are now signed or countersigned by it. Moreover, the Communist Academy, which was disbanded in the late thirties, has now been revived under the new name of the Academy of Social Sciences. It comes under the direct authority of the Central Commit-

(CONTINUED ON PAGE 148)

Reconversion Brings Some News Problems In Company Pension Plans

New York

• • • **In the transition from a wartime to a peacetime economy, several unanticipated pension problems have emerged. Among the most pressing of these problems, it has been observed by the National Industrial Conference Board, is the reinstatement of automatic retirement provisions of the company pension plan.**

Prior to the war, most employers with pension plans required older employees to retire when they reached a specified age (usually 65). Because of the acute shortage of labor during the war years, automatic retirement was not generally enforced. Older workers, with their special skills, became a valuable part of the working force and were encouraged to remain at work. In many instances, employees on the pension payroll were asked to return to work, if their physical condition permitted.

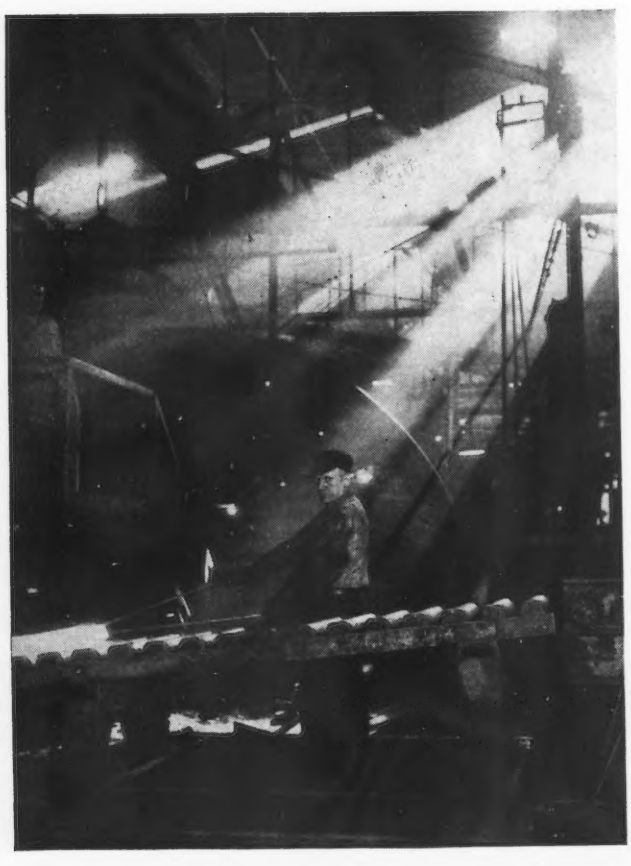
Management has now found it difficult to reinstate automatic retirement for superannuated workers since so many exceptions were allowed during the war period. One company pointed out the advantages of automatic retirement to reluctant employees who had reached retirement age by stating: (1) It is the only way that the plan can be administered with fairness to all; (2) it will help restore jobs to employees returning from military service; (3) it will encourage the training of younger employees for positions left vacant by retired employees; (4) it will provide opportunities for promotion of younger men and women; (5) it is an orderly way to discontinue the service of those who, for one reason or another, are unable to carry their full share of responsibility; (6) it convinces the employee that he will actually be retired at age sixty-five and accordingly will induce him to organize his plans for the future.

In addition to the understandable reluctance of older workers to retire, some of the unions have questioned management's right to retire workers at 65 under a pension plan. One union brought action before the National Labor Relations Board and took the position that the company was refusing to bargain on pension plan layoffs in violation of the Wagner act. Another union threatened to strike if the company enforced an automatic retirement ruling. In another case, the union claimed that the employee who had reached retirement age and who wanted to continue in his job cannot be severed without his consent if he has the ability to work; that the union should be consulted on severance policy; and, finally, that such action on the part of the company would violate the contract clause requiring application of seniority when layoffs are necessary.

There are indications that some of the unions are preparing to campaign for company pension plans and to obtain more active union participation in the administration of pensions and other welfare benefits. A number of unions are endeavoring to have the provisions of present pension plans incorporated in the collective bargaining agreements. Where wage earners are not covered by a pension plan, many unions are demanding that the employer provide noncontributory retirement benefits. Some unions are asking for a welfare fund which will include pensions as well as other benefits and which will be largely administered by the union.

Another problem which is coming to the fore, The Conference Board finds, is the probable increased cost of pension plans because of increases in wage rates obtained by the unions during the past year. The threat of a "second round" of wage increases also perturbs management, as these augmented rates would raise the costs of pensions to a still higher level. One company estimated that its pension costs are 20 pct higher this year because of the increases in wage rates.

Since many pension plans were adopted during a period of lower living costs, some concern is expressed as to their adequacy under present conditions. At a time when living costs are steadily increasing, some companies question whether it is possible to retire employees on pensions which were considered ample at the time the plan was put in force, but which are inadequate on the basis of present-day living costs.



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LAST OF LA BELLE: *John Youngman, who has worked at the La Belle works of Crucible Steel Co. of America for 36 yr starts one of the last slabs into the rollers of the last mill in operation at the plant which is now being razed. La Belle, the oldest steel mill in Pittsburgh, is being transferred to the Crucible Midland plant just about a century after operations were begun at La Belle in 1836.*

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ALFRED J. OFFNER: Consulting Engineer, New York, N. Y., Retiring President, American Society of Heating and Ventilating Engineers.

DR. BALDWIN M. WOODS: Director of University Extension, University of California; New president of Heating and Ventilating Engineers.

LAWRENCE P. SAUNDERS: Chief Engineer of Research Harrison Radiator Div., General Motors Corp.; Chairman, Committee on Research.

F. E. MEHRINGS: Meyer Furnace Co. Peoria, Ill., retiring president, National Warm Air Heating and Air Conditioning Assn.

Building Prospects Bring Crowd to Heating and Ventilating Exhibit

Cleveland

• • • Symptomatic of the tremendous expansion in the manufacture of heating and ventilating equipment following the war, more than 400 exhibitors, the largest group of this kind ever brought together, participated in the seventh International Heating and Ventilating Exposition, which was held in Cleveland's Public Auditorium for five days, beginning Jan. 27.

The Exposition, which was held under the auspices of the American Society of Heating and Ventilating Engineers, has been seen by more than 20,000 manufacturing executives, scientists and building leaders. The previous heating and ventilating exposition was held here in 1940.

Concurrent with the exposition, which it sponsors, ASHVE held its 33d annual meeting and the National Warm Air Heating and Air Conditioning Assn. convened for its 33d annual convention, Jan. 29-30.

The heating and ventilating industry has greatly increased the number of items produced, as well as productive capacity, and many of the exhibitors at the exposition have been able to show only token displays. A number of newcomers have also entered the scene.

During the war, special requirements of the armed forces produced a number of innovations and brought about considerable redesign of equipment to meet the changing materials situation. These advances have been capitalized in reconversion planning and have combined to create advances that are in some ways spectacular.

An exhibitor of air conditioning and industrial refrigerating equipment, besides going more heavily into fans for mechanical draft for power stations and fans for industrial plants, plans to more than double the best prewar year's output during the next 12 months. Another exhibitor, specializing in automatic control devices, plans to more than treble prewar volume. This exhibitor manufactures more than 3000 kinds of automatic controls.

National Warm Air Heating And Air Conditioning Group Also Hold Meeting

Every kind of equipment required to improve and modulate indoor climates in places of business, residence and industry is being displayed, along with instruments for detecting the minute differentials expressing atmospheric changes, controling devices of a high degree of accuracy and apparatus used in the laboratory for advanced study purposes and routine supervision of manufactures will also be on display.

Among the 400 exhibitors are suppliers of raw and fabricated material, many of which have been developed for special requirements, specialized components, single purpose units and complete systems.

Materials on display include metals and alloys in cast, forged, sheet and tube forms, plated and clad materials, insulated conduit, refractories, storm sash and screens and special tools for maintenance and repair.

Exhibits include furnaces, burners for oil and gas, gas and oil fired heaters, stokers, rotary and gun-type oil burners for industrial use as well as domestic furnaces and boilers, warm air furnaces and stoves, registers and grilles, forced and gravity circulating systems, ductless central heaters, closet heaters, "packaged units" including systems which coordinate blower speeds with bonnet temperatures, high and low presure steam systems, instantaneous heaters, and systems burning coal, oil and gas.

Air conditioning exhibits include systems and units for heating, filtering and circulating air under various methods of control from semi-to-full automatic, multiple unit systems with individual regulations for multiple apartment buildings, unit heaters for industrial use, fans, blowers, duct construction, radiators, convectors, radiant heating coils and panels.

Also on display are pumps of all types, piping and pipe fittings for threaded and welded connections, tubing for heating and cooling coils, automatic controlling devices for regulating temperatures, including some electrical applications, and precision instruments for indicating and recording temperatures, pressures, volume, etc.

Events for ASHVE members got under way Jan. 26 with a series of committee meetings at Hotel Statler and at the ASHVE research laboratory here. At the opening session Jan. 27 at the laboratory, special dedication ceremonies were conducted to mark the official opening of the laboratory in the Society's own building. The forum on Jan. 28, on panel and radiant heating, was of particular interest.

Guiding the policies and program of the exposition was an advisory committee appointed by the Society, composed of the following members:

Alfred J. Offner, president of the Society, chairman; B. M. Woods, first vice-president, vice chairman. Membership includes the following representatives of the Society in their respective affiliations:

L. P. Saunders, chairman, committee on research; Herman Seelbach, Jr., president Western New York Chapter; H. R. Allonier, president, Central Ohio Chapter; A. W. Edwards, president, Cincinnati Chapter; F. R. Bishop, president, Michigan Chapter.

Representing other organizations having a cooperative interest in the exposition are the following committee members:

Stewart E. Lauer, president, Air Conditioning & Refrigerating Ma-

(CONTINUED ON PAGE 123)

Commission Issues Report on Plans for French Steel Industry

Expansion and Modernization Program Aims at Output Of 19.8 Million Tons

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By JACK R. HIGHT
European Editor

o o o

London

• • • **Complete details of** the modernization and expansion plan for the French iron and steel industry over the next 5 years are available now in the text of the first report of the modernizing commission for the industry. The commission was appointed as a part of the broader program for the modernizing of all of French industry (see THE IRON AGE, Nov. 21, 1946, p. 119) and is composed of representatives of the Iron & Steel Trade Assn., the French Ministry of Industrial Production, as well as the Ministry of National Economy, plus union and industry representatives.

Since its establishment in March 1946, the commission has been conducting a series of meetings of its own staff and in collaboration with other interested groups in carrying out the tasks assigned to it by the general French "Planning Council." This includes putting the French steel industry in a position to produce, as soon as fuel allocations permit, 6,600,000 tons of steel ingots, plus 1.1 million tons of pig iron, for direct consumption, to be able to reach the 11 million ingot ton output of 1929 within 3 years, and in an additional period of less than 2 years to expand French capacity to 13.2 million tons of ingot steel plus 2.97 million tons for castings. The council indicated that all of these measures should be planned in the light of an ultimate target of 19.8 million tons of steel, including ingots and castings.

The report of the commission outlines in great detail the complexity of establishing today's theoretical capacity for French iron and steel production, but comes to the conclusion that apart from the heavy war damage sustained by the works at Mondeville and Leval-Aulnoye, the 1929 output of 1.1 million tons has been increased by at least 20 pct, and uses by way of approximation the figure of 13.2 million tons of French capacity.

It is noted that in consideration of existing conditions in furnaces the supplies of fuel and labor make the 13.2 million ton figure an academic concept at the moment. It is interesting to note, however, that the actual capacity of the French steel industry at the moment is roughly equivalent to the requirements of the Planning Council for the first three of four development stages conceived to cover the first 3 years of the 5-year plan.

The problems which the commission has been wrestling with for the past 8 months are more concerned with questions of organizing production than they are with expansion, and are more interested in modernizing existing capacity to make it economical than they are in building completely new facilities.

Some sentimental notice is taken in the report of the commission of the theoretical desirability of writing off all existing steel capacity in France and starting from scratch, but unfortunately social considerations bar this simple method of operation. Disregarding the Communists' suggestions for nationalizing the French iron and steel industry, the commission states at the outset that the plan which they propose will be efficient only to the extent to which it is accepted by the industry.

For this purpose it asked the French trade association, the Chambre Syndicale de la Siderurgie, to submit the programs of the different steel companies. It was recognized that simply adding all these private suggestions would not achieve the desired results from a national standpoint, and for this purpose the commission considered its real work to be within the scope of fitting the suggestions of the steel industry together into a logical plan for the country as a whole.

There are some exceptions to this general theory where the necessity for rationalization and the large capacity of certain modern production units will make it necessary for firms to act cooperatively along the lines outlined by the commission.

In contrast to the plan of the British Iron & Steel Federation for the development of the industry in the United Kingdom (see THE IRON AGE, May 23, 1946, p. 114) which goes into details as to the production program for individual works, the report of the French commission spends more time drawing in the outlines of a general program for the industry rather than attempting to fix permanently the development program of each and every steel mill in France.

There were a number of reasons for adopting this attitude, including a pressing demand for the completion of the report, plus a recognition of the uncertainty of technical factors affecting the development of the industry over a minimum period of 5 years. In particular the commission notes that changes in the availability of essential raw materials may alter seriously the iron and steel outlook, and accepts the fact that the market for the chief raw materials is likely to remain unstable for several years to come.

Particular attention is called by the commission to the possibility that an oxygen blast system for bessemer converters might permit all rejected material from the works to be remelted. Considering such a development to be within the realm of possibility, the commission has avoided making detailed recommendations which might be upset by this or other technological improvements.

In submitting its report to the government, the commission points out that to a very great extent the program which it suggests forms an integral whole,

the parts of which could only be supported with great difficulty. Without discussing the desirability of a larger or smaller target figure for French steel production, the plan is aimed at 16.5 million tons, and according to the commission would have to be completely revised to be modified for any target figure of less than 13.2 million tons.

Raw Material Supplies

Statistics used in the French report are in most cases based on 1938 as a typical prewar year, although production in that year, 6.71 million tons, was actually a low output year. Steel output in 1929 totaled 10.67 million tons, and an average for the 15 years from 1926 to 1939 would be about 8.36 million tons. This figure was approximated in 1939, but, due to the unusual consumption trends attributable to the war, 1939 is not considered a normal year.

The major basis for the French iron and steel industry is the nation's wealth in iron ore, and, except for a minor flow of nonmanganese hematite ore imports, France has always been able to satisfy her own requirements as well as maintain a high level of exports. The exports of ore are doubly important because they make it possible for France to pay for its fuel, much of which must be imported. The essential statistical data for French ore production for 1938 are included in table I.

The future prospects of French ore reserves are difficult to assess because of the hazy nature of some of the prospecting in the case of the Lorraine seams as well as the usual uncertainties surrounding the estimation of any ore reserves. The commission, however, states that *if* there is no major alteration in the pattern of the domestic and international markets for French ores, and *if* French consumption remains in the region of the figures proposed by the Planning Council, known French deposits should last for approximately another century. The commission takes the opportunity in its first report to emphasize the urgent necessity both from an industry and a national standpoint of more systematic prospecting of the French iron ore resources.

TABLE I

French Iron Ore Production in 1938
(In thousands of net tons)

	Lorraine	Normandy, Anjou, Brittany	North Africa	Other Mining Areas
Output	34,100	2,172	4,070	146
Home consumption	17,400	649	146	99
Exports	13,900	1,380	3,840	....
Belgium	4,876	399	169	....
Luxemburg	4,280	....	....	....
Saar	4,565	2	1,103	....
Germany	183	570		
Great Britain	....	316	1,224	....
Imports	....	198	....	....

The suggestion is made that a national policy for the working of the French ore mines should be involved to insure that the basic terms are accepted in the perpetual compromise that characterizes the mining problem. It is pointed out that the French iron and steel industry, which is at a disadvantage in paying for imported coal, must make up for this inferiority by acquiring its ores at a low cost. This necessity, however, threatens to prejudice the technical perfection of the mine workings.

The commission points out that these questions are primarily metallurgical and states that it is essential to maintain a close link between the iron mines and the steel industry. On the other hand, the commission advocates that a general sharing system be established insuring the rational distribution of the ore without consideration of the existing links between steel firms and mining concessions.

The most serious problem relating to the French ore mines is the shortage of labor which threatens to more than discount any progress made in mechanizing mining and ore handling. Compared with 30,000 workers in 1938, the total number of men in the mines has now fallen to 22,000, and the requirement in the last stage envisaged by the Planning Council will be for 40,000 workmen. A vast appeal to foreign labor, which it seems can come only from Italy, is considered by the commission to be indispensable.

The necessity for a reversal of the French prewar position as an exporter of iron and steel scrap is indicated in the commission's report on this subject. According to the records kept by the Comite des Forges, the following amounts of scrap were absorbed in the French industry in 1938: Steelworks, 2,325,400 tons; blast furnaces, 707,300 tons; and rolling mills, 97,800 tons.

The amount of imports was

SNOW OBSTACLE: *This French truck manufacturing plant refuses to let war damage halt reconstruction. This is a snow scene inside one of the Berliet plants near Lyons where work goes on despite a 3-in. snowfall within the shop.*

negligible, but exports, although the existing customs statistics are of a dubious character, probably totaled about 462,000 tons in 1938. While in the future the bessemer steelworks will continue to supply some scrap for the open-hearth works and the scrap industry may be developed, the commission stresses two problems which may nevertheless arise: Scrap constitutes the richest source of iron; its treatment requires a minimum of calories and therefore the commission recommends that French scrap should go to French works, and that in principle exports should be prohibited.

It realizes that as matters stand at present scrap stocks which are located far from consuming centers, as for example at Mediterranean ports or Atlantic ports, may be more advisably exported provided that large quantities of foreign currency are obtained in exchange.

The recently negotiated trade agreement between France and Italy, which provided for the export of French scrap, would apparently be in contradiction to the commission's plan, but most of the scrap which France will ship under the agreement is located in Morocco, and the glittering prospect of obtaining Italian machine tools with immediate delivery from stock obviated the necessity of obtaining hard currency to procure such machine tools in dollar and sterling areas.

The commission also points out that the segregation of scrap for particular purposes in the French steel industry has never been properly developed, possibly due to the absence of a coherent pricing system, and recommends that the interested authorities should apply themselves to the solution of its price problem.

The consumption of pyrites ash of the French blast furnaces has always been low in relation to the resources placed at the disposal of the calcining works, partly due to the absence of means of agglomeration in the iron and steelworks—this should be corrected soon—and also because most of the ash from imported pyrites contained copper and other undesirable elements.

The refining of the pyrites ash, although a well known process has never been undertaken in France, and the commission expresses dissatisfaction on this point. Inasmuch as a larger use of the ash might eliminate the necessity for any ore imports, it is suggested that the chemical industry study the refining question in connection with the iron and steel industry so that at the very least a definite ruling might be made that the operation will not pay.

The consumption of manganese ore by French works, which totaled 347,600 tons in 1938, will probably expand to about 660,000 tons in the final stage of the plan on the level of 16.5 million tons of steel output. Before the war, imports were required to cover manganese ore needs, and there is no particular development foreseen by the commission which will alter this situation. It is noted that this need will be a drain on foreign currency requirements, and therefore the working of Morocco deposits is urged as well as intensifying research to reduce manganese ore requirements.

The French steel industry has always been largely dependent on other European countries for its supplies of refractory materials: Belgian dolomite, German silica bricks and Austrian magnesia. The successful development of obtaining magnesia from the sea is noted in the report, and the commission recommends strongly the construction of such a plant in France as well as systematic prospecting in the already known deposits of dolomitic limestone in France.

Fuel Supplies

Although the fuel supply question was not considered by the modernization commission to be a fundamental task, considerable emphasis is placed in the report on the importance of supplying suitable quantities and qualities of fuel at prices which will permit the French steel industry to compete in the international market. The nationalization of the French coal mines has placed a black cloud on the horizons of the French steel producers who in common with the steel industries of the world had insured their coal supplies by buying coal reserves and operating their own mines.

The commission notes that the French iron and steel industry asks some special safeguards to insure that both quantity and quality of shipments will be maintained. In the international field the commission calls on the French Government to assure the required imports of coal, particularly from the Ruhr, in order that any program for expanding steel production may become possible.

For the coals which the steel industry uses for other than coking purposes, the commission foresees a gradual declining need due to the improved heat performance of furnaces, the substitution of gas for solid fuel and the establishment of integrated steel plants, all of which may eventually result in a 20 pct reduction in this particular type of coal.

Special note is taken of the possibility that important additional reductions may be made by the expanded use of fuel oil, but the commission notes that this is fundamentally an economic question as the substitution for this perhaps would not free any scarce coking coal and therefore is outside the jurisdiction of the body. The commission does stress, however, that if the technical changes to the furnaces are sufficiently important in changing over future supplies of fuel oil should be carefully assured before any long-range substitution programs should be started.

The French steel industry consumed 7.26 million tons of coke in 1938, of which 63 pct was imported either directly or in the form of coking fines. To eliminate this dependency on Holland, Belgium and the Ruhr, the commission points out that the French Government must assure that the nationalized French mines will not disturb the distribution of coking coals to the detriment of the steel industry.

The steel industry itself should be able to improve the situation by increased preparation of blast furnace charges which, according to the report, may result in a 15 pct saving of the gross weight of coke required. In this field and in other developments of the operation of blast furnaces the commission expects important developments over the next few years, but emphasizes that unless there is a close bond between the blast furnace operations and the coking plants the developments are certain to be delayed. Recognizing

that these developments represent long term work which is after all only a possibility, the French must continue to obtain from the Ruhr most of the coke and coking fines which they need.

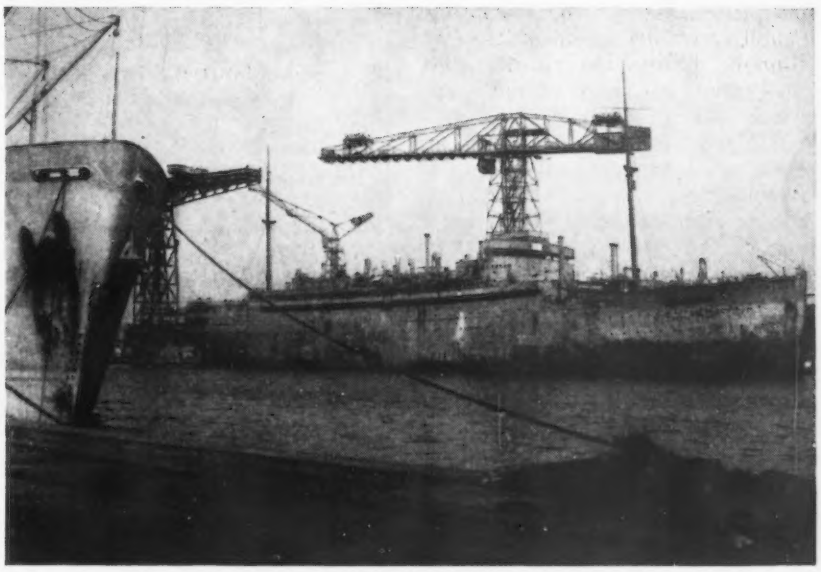
Making a certain number of admittedly debatable assumptions, the commission estimates that coke requirements for an initial program of 7.7 million tons of steel ingots and castings would amount to 6.93 million tons, and for an ultimate program of 19.8 million tons of steel ingots and castings, 15.51 million tons of coke will be required.

Structure of French Industry

Largely geographical dictates have divided the French iron and steel industry into several distinct units: (1) The Lorraine area which represented 67 pct of the French crude steel output in 1938 and consists of fairly large production units based on the ore; (2) the northern area which in the prewar year accounted for 19 pct of the total output and is based on coal fields. It is composed of a number of small and medium-sized rolling mill plants surrounding three fairly large basic steelworks; (3) the works in central France and the Loire basin producing high quality steels primarily for military purposes. These units are based primarily on coal deposits and occasionally on iron, but are generally less favorably placed than the other units with regard to raw material supplies. Some of them are well placed for electric power and most have some local access to scrap supplies, but many exist only on the strength of tradition and are justified only by the existence of these bodies of skilled labor; (4) the Alpine works based on local power resources consisting entirely of electric steelworks.

In addition there are to be found scattered throughout France a certain number of small works including a homogeneous coastal group whose existence was justified in former times by ore imports and which in some cases are still justified by coal imports. In the case of the Mondeville works this justification is strengthened by the use on the spot of Normandy ores.

Taken together these areas include 177 plants, of which 23 are completely integrated, 23 are blast furnace plants only, 40 have steel furnaces, rolling mills and other finishing facilities, and 91 are rolling mills only. This enumeration excludes tube works which according to the rather unusual French custom are not generally included as a part of the iron and steel industry.



PORT AFTER THE STORM: *Most French ports were virtually obliterated during the war but shipping is vital to the revival of French foreign trade. Here in St. Nazaire at the Penhoet shipyards the prewar passenger liner "De Grasse" is being refitted for the transatlantic service.*

Without entering into discussion on borderline cases, the commission's report describes 66 of the plants as "producing" units which work the metal they refine, and 111 as "conversion" works which buy all or most of their semifinished steel from other plants.

The equipment of these 177 plants at present totals:

190 blast furnaces,
90 basic bessemer converters,
125 openhearth furnaces,
186 electric arc furnaces,
28 induction furnaces.

The scattered nature of the production units and the survival of units whose technical or economic justification has vanished is noted by the commission, which adds that the only grounds for the existence of many of the French steelworks are social or financial. Attention is called to the more or less admitted theory that production units capable of turning out approximately 1 million tons of steel are about ideal, and allowing itself to wander into a momentary Utopia, the plan points out that an ideal situation for France, assuming 12 such production units plus another 12 for certain special manufactures, would be a maximum of 24 such works.

Anticipating a decision on the future size of blast furnaces, it is pointed out that for the production of 13.2 million tons of pig iron per year, which it seems likely will be required, the average daily production of the 190 existing blast furnaces would be 192 tons. These considerations are the fundamental reasons for the existence of the Modernizing Commission.

The results of the existence of scattered small production units are reflected in prices and, much more important to the French Government today, involve some waste of labor. In 1938 for an output of slightly over 6 million tons of ingot steel, the basic sections of the industry employed 142,000 people, which the commission said is four to five times more people than American firms utilize for the same output. Taking into consideration the special production, which the average American firm would not consider, and also the fact that the French industry was operating at only 50 pct of capacity in 1938, the commission predicts that it may be possible by the concentration of works to insure a saving in labor of at least 60 pct.

Writing off as impossible inside

the structure of the existing French economy to build 12 new Utopian production units, the commission recognizes that the rationalization which can be accomplished must be based on a series of existing installations. Although this solution admittedly brings about technical imperfections in the way of theoretically artificial transport costs, from the social and financial grounds, it is by far the most simple application.

The problem of the independent reroller is another section of the overall headache which the commission's plan attacks with vigor, although the theoretical implications are delicate. From a technical standpoint the commission considers that the reroller's existence is justified for production of some small quantities of special products, geographically in some relatively isolated consuming centers and particularly for rolling products which might otherwise have to be remelted. However, outside these cases the reroller involves needless fuel consumption and waste of manpower as far as the French national balance sheet is concerned.

Breakdown of Production

The 1938 output of French pig iron and steel industries may be broken down approximately as indicated in tables II and III. The total output of finished products amounted to 4,579,000 tons and was distributed as indicated in table IV. To give an indication of the amount of iron and steel products actually placed at the disposal of French consuming industries, exports and home consumption are listed in table V.

Pig iron output in 1938 totaled 6,667,000 tons as against 6,804,000 tons of steel production. There has been a generally decreasing trend in France as in other countries in the relationship of pig iron output to steel. In 1913 pig iron represented about 130 pct of steel output, and in 1929 was still 107 pct. In addition to the technological factors involved, the erection of the Corby works in Britain and the Wattenstadt in Germany in order to free those countries of dependency on imports of French semifinished steel, represent a factor which cannot be discounted.

Having previously discussed France's own supply needs on a strictly self-sufficient basis, the commission here chooses to talk about an ideal world and more particularly an economically rationalized Europe which would condemn the use of low-grade ores that are great fuel eaters.

The Planning Council has considered these factors in pig iron output in the last three stages of the development of the iron and steel industry, and the commission is urging the expansion of research in improving basic bessemer steel in order that French ores may be utilized most economically.

In 1913 basic bessemer steel represented 70 pct of the French output and openhearth steel 25 pct, while in 1938 the basic bessemer figure was 60 pct and the openhearth figure was 33 pct. The development of increasingly specialized needs by steel consumers poses a problem which is difficult for the commission to predict in advance.

The commission, however, stoutly maintains that even though better characteristics are being demanded of steel, there is no reason to assume that this irrevocably dictates the increased production of openhearth steel. The possibilities of perfecting the classical basic bessemer process, or even more important by applying the Perrin process, constitute the primary hopes of French basic producers in this respect. Results obtained from the application of the Perrin process at the Valenciennes works of the Steelworks of the North and East (see THE IRON AGE, Oct. 31, p. 35) are accepted by the commission as conclusive on this subject.

Considering the need for consuming process scrap and the best possible economic use for all forms of scrap, the commission has taken, somewhat arbitrarily by its own admission, the figure of 33 pct for the proportion of openhearth production to the total. This figure may be subject to some revision in the coming years, as the construction of openhearth capacity may give way to additional electric steel production as new hydroelectric power is developed in the French Alps.

As in other countries, the product mix has altered in character over the past decade with increasing emphasis on lighter products, and the commission has made a forecast, with the assistance of principal French consumers, as to the probable future developments of this trend. The following list constitutes the commission estimates for rolled product requirements, assuming a crude steel output of 13.2 million tons:

Total of rolled products	9,480,000 tons
Rails and track material	506,000 tons
Small girders	715,000 tons
Pile sheeting	55,000 tons
Concrete bars	3,333,000 tons
Special sections	55,000 tons
Plates	484,000 tons
Medium sheets	297,000 tons
Thin sheets	1,144,000 tons
Wide flats	77,000 tons
Coated sheets	176,000 tons
Tinplate and black sheets	297,000 tons
Machine wire	913,000 tons
Hoop iron and strips	440,000 tons
Tube billets	418,000 tons
Tires	99,000 tons
Semis for forging	165,000 tons
Semis for export	330,000 tons

As an interesting contrast the report of the commission has compared the advantages of particular items which will be required according to their estimates against a summation of the proposed private building programs

TABLE II

French Pig Iron Output in 1938
(In thousands of net tons)

Basic iron	5245
Basic foundry pig iron	655
Semibasic cast iron	108
Haematic foundry cast iron	249
Haematic forge pig iron	227
Spiegel	78
Ferroalloys	102

TABLE III

French Steel Production in 1938
(In thousands of net tons)

Basic Thomas	4108
Openhearth	2281
Electric	339
Acid bessemer	53
Crucible	20

TABLE IV

Output of Finished Products in 1938

	Tons
Rails	334,000
Sleepers	92,400
Chairs and plates	34,100
Small girders	380,000
Sheeting piles	30,800
Concrete bars	162,800
Commercial rolled sheets	1,457,500
Thick sheets	305,800
Thin sheets	482,900
Wide flat bars	36,300
Tinplate	144,100
Machine wire	434,500
Hot-rolled hoop iron	166,100
Tubular strips	41,800
Bar iron for tubes	176,000
Wheel rims	55,000
Wrought pieces	63,800

TABLE V

French Iron and Steel Home Consumption and Export in 1938
(In thousands of net tons)

	Tonnages Made Available	Home Consumption	Exports
Pig iron	1266	711	554
Ferroalloys	25	12	13
Cast steel	169	169	...
Semifinished	213	....	213
Finished products	4579	3807	765
Total	6252	4699	▲1545

submitted by the industry. This comparison is set forth in table VI.

The importance of iron and steel exports which in 1938 totaled 25 pct of the production is emphasized by the commission. A breakdown of the nature of the exports furnished in table VII indicates an increasing trend away from pig iron exports towards increasing amounts of finished products. The abnormal figures for 1938 are attributable to special difficulties met by France's customers, due to shortage of raw materials, and do not represent a reversal of the trend.

The favor which in past years French heavy steel products and semifinished material has found in the international market is attributed by the commission to the fact that, due to its favorable ore resources, the French industry was able to fix an excellent price on the former, while a shortage of modern rolling mill equipment caused it to lose this advantage in the sale of more highly finished products.

As for the policy of exporting iron and steel products, the Planning Council and the commission recognize that, although it might be theoretically more profitable to the nation's economy to export steel in the form of manufactured articles, national shortages of coal, power and labor will make broad expansions of manufacturing plants slow. To counteract this problem, a maximum of exports of iron and steel products is considered to be essential.

Table VIII summarizes the export/import position as far as the French iron and steel industry is concerned for the year 1938. This effort to increase exports of iron and steel products will, of course, simplify to a certain extent the problem of modernizing the rolling mills by expanding the potential market for their products. As already reported, the commission has advocated the installation in France of two continuous hot strip mills and several continuous cold reduction mills. If the commission had chosen to decide that substantial steel exports were inadvisable, then it would have been impossible to justify the purchase of two hot strip mills of such capacity.

TABLE VII

Percentages of French Iron and Steel Exports

	1929	1933	1936	1938
	Pct.	Pct.	Pct.	Pct.
Pig iron	21.7	12.1	11.1	32.7
Semifinished products	23.7	23.4	23.3	12.1
Finished products	54.6	64.5	65.6	55.2

TABLE VI

Comparison of Required Tonnages of Rolled Products with Proposed Tonnages of Private Building Programs

	Proposed Tonnage	Tonnage Required
Rails and track materials	858,000	506,000
Small girders	1,485,000	715,000
Pile sheeting		55,000
Concrete bars	2,761,000	3,322,000
Special sections	143,000	55,000
Wide flats	176,000	77,000
Tinplate and black sheets	132,000	297,000
Thick sheets	891,000	484,000
Medium sheets		297,000
Thin sheets	803,000	1,133,000
Coated sheets		176,000
Machine wire	715,000	913,000
Hoop iron and strips	807,000	440,000
Round bars for tubes	176,000	253,000
Rims (tires)	88,000	99,000
Forging semis	132,000	165,000
Export semis	550,000	330,000

In order to keep its friends in the world market, the French steel industry will be forced, despite a serious domestic shortage, to begin immediately with more substantial steel exports, and the commission has recommended that from the beginning of this year a minimum of 55,000 tons monthly should be earmarked for export.

The commission takes note of the fact that if the steel cartel is reestablished quotas will be dictated recognizing markets which have already been established, thus increasing the desirability of expediting shipments to other countries.

Technical Considerations

Although every effort has been made by the commission to avoid entering into technical details

TABLE VIII

Export and Import Position of the French Iron and Steel Industry in 1938

	IMPORTS		EXPORTS		NET IMPORTS OR EXPORTS	
	Weight (net tons)	Value (francs)	Weight (net tons)	Value (francs)	Weight (net tons)	Value (francs)
Fuel	6,200,869	1,250,649,003	25,394	7,083,016	−6,175,474	−1,243,565,987
Iron ore	480,649	74,098,197	17,064,543	908,701,000	+16,583,893	+834,602,803
Scrap iron	267	734,103	487,643	182,445,000	+487,375	+181,710,897
Other ferrous elements	5,678	190,000	71,971	3,701,000	+66,293	+3,611,000
Dephosphorization slag	11,324	2,090,000	306,010	56,855,000	+294,685	+54,765,000
Manganese ore	347,191	169,073,800	5,619	11,163,000	−341,572	−157,910,824
Other ores	42,724	72,272,612	.....	.....	−38,324	−72,272,612
Sundry materials	217,129	51,656,945	.....	.....	−217,129	−51,636,945
Cast iron	9,728	10,803,402	591,720	331,865,000	+581,992	+321,061,598
Ferros and additive metals	2,321	53,856,010	24,880	102,833,000	+22,559	+48,976,990
Semifinished products	10,045	15,977,000	200,808	177,308,000	+190,763	+161,331,000
Special steels	5,586	39,445,000	6,065	43,108,000	+478	+3,663,000
Finished products	24,613	117,462,000	1,222,436	1,906,966,000	+1,197,823	+1,789,504,000
Total	7,358,124	1,858,308,072	20,007,089	3,732,028,016	+12,653,362	+1,873,719,920

that might become too rigid for the most desirable development, a certain degree of progress has been considered as standard and some minimum limits for modernization are set down. Only main issues are specified and a number of exceptions are made but the broad general outlines are included.

The report calls attention to the essential difference in the nature of blast furnaces operating on Lorraine ores in comparison with richer American or Russian ores. Considering the factors of difference, the commission comes to the conclusion that new furnaces to work with Lorraine ores should not be constructed with a hearth measuring less than 5½ m.

A furnace of this type in French practice will produce about 500 tons of pig iron per day, and a number are already in existence. The possibility is mentioned that new progress may indicate larger furnaces, and the commission is recommending an immediate test project in the Ruhr to examine the behavior of Lorraine ore in a large diameter furnace.

This edict will not condemn all smaller furnaces, for the added cost of rebuilding furnaces of slightly smaller sizes would probably write off any possible savings, but generally speaking the commission has fixed as an absolute minimum 4½ m.

To save as much coke as possible, considerably more work in preparation of blast furnace charges is recommended, and the commission hopes that an ultimate saving of about 15 pct of coke may be effected. Exceptions will be made in the case of furnaces making foundry pig and on hematite pig where the capacity is smaller in comparison with the installation expense. Agglomeration by fritting is recommended for works dealing with powdered ores, particularly pyrites ash.

Beyond these formal recommendations the commission does not express a positive opinion on the advantages to be afforded by the use of oxygen enriched blasts in blast furnaces and basic bessemer converters. German tests are regarded as inconclusive, Russian tests unreported, but the commission is following closely French research under way at present at the Neuves-Maisons works.

Broad recommendations for the more economic use of gas and the replacement of inefficient hot blast stoves are also included in the report. In prewar practice only 43 pct of the coke consumed in the French industry was produced at the site of the blast furnaces. In connection with the general recommendations for overall fuel economy, the commission recommends the construction of additional carbonizing capacity in the blast furnace plants.

Without embarking on a discussion of the technical features of electric power stations in the iron and steel industry, the commission suggests immediate development of larger units as well as an investigation into the possibility of adapting gas turbines to such power stations. The technique is considered by the commission to be particularly suited to the installation of generating equipment working on blast furnace gas.

The commission feels that gas engines or turbines whose efficiency is too low or entails too high a gas consumption should be replaced as soon as possible, and considers that generating sets consuming over 3500 cal per kw should be kept only as reserves except in the case of small, isolated works. In order to reach and exceed this limit it will probably be necessary in important iron and steel regions to construct large interworks power stations. An additional advantage of these power stations will be that by the interconnection of blast furnace gas which is involved certain gas losses will be avoided.

For new Thomas converter plants the lower limit of capacity for the units will be 30 tons, and no older works which will be modernized will be included if the converters are smaller than 20-ton capacity. Recommendations of the commission with respect to an oxygen enriched blast in the Thomas steelworks have already been mentioned in connection with blast furnaces.

The possibility becomes even more interesting in this field owing to the prospect of improving the quality of the basic method by decreasing its nitrogen content. This improvement of basic steel is one of the primary objectives of the French iron and steel industry and the commission.

The general practice of preparing blast furnace charges will offer more regular pig iron for the converters, and in addition the commission is asking that German patents taken out some years ago for the improvement of Thomas steel should be made available free of charge to the French industry (while in the same breath the value of such patents is deprecated). Attention is again called in the section of the report making recommendations on Thomas steel production to the progress made with the Perrin process at Valenciennes under the trade name Ugiperval process.

Inasmuch as France depends on the Thomas process for producing ordinary quality steel, the average size of its openhearth furnaces will remain small. The commission suggests that 100-ton to 200-ton furnaces represent the maximum that it is reasonable to recommend, and to afford a maximum of flexibility for the production of a number of grades of special steels, some smaller units should be available.

The commission therefore cautiously goes so far as to say that a completely rebuilt openhearth should not have a capacity of less than 88 tons for ordinary steel or 55 tons for special steels. In the plan for modernizing older plants consideration will be given only to openhearth furnaces with a capacity of at least 55 tons for ordinary steel and 33 tons for special steel.

Regret is expressed that, due to the difficult conditions of working and the variety of steels to be made, fuel consumption standards for openhearth furnaces were impossible of agreement. For duplex Thomas-electric steel production the maximum capacity of electric furnaces is recommended at 30 tons for the older furnaces which are to be retained. For isolated works producing alloy steels the commission chooses not to fix a lower limit for the capacity of the furnaces.

In addition to the recommendations for two continuous hot strip mills and suitable cold reducing capacity to supplement them as previously reported in THE IRON AGE, the commission is recommending the construction of one 5-stand tinplate mill. Some problems in the full realization of this extensive flat-rolled program are anticipated with respect to pro-

curing sufficient foreign currency for the purchase of mills.

Bearing this fact in mind, the plan specifies that one of the continuous mills plus one 3-stand cold reduction mill will constitute the first and most urgent segment of the program, and at a later stage additional units will be procured.

Suitable progress is anticipated in standardizing rolling mill products in order that existing mills may reduce their product lines and roll for longer intervals without change. The plan calls on the French Standards Assn. to extend its work of defining obligatory standards and suggests that a system of severe price penalties of at least 100 pct be applied on nonstandard products.

The industry in France is comparatively well equipped with average sized forging presses, but in most cases these presses are deficient in auxiliary equipment that will permit their operation at anything approaching theoretical capacity. It is suggested that additional heating, heat treating and machining facilities should be supplied so that the forge shops can work at least at 75 pct of their theoretical capacity.

In addition the commission calls for the installation of a new press of at least 13,000 tons which will be twice as large as any existing unit in France. Although due to the restricted application, it is doubted that the unit can be bought by industry in the normal fashion. The plan is that the press should be purchased with the company concerned paying for it within the limits of possible profits and the balance would be made up by the state.

Particular attention is to be paid to the development of research work which will be carried on between the laboratories in the mills and the pure research of the universities. The commission expresses the view that, particularly in the field of ordinary steels, research which has been carried on in the past has unfortunately been of a rather narrow scope. To fill this gap the trade association of the industry has set up the "Institut de Recherches de la Siderurgie" which is now organizing a staff and setting up a central laboratory.

The installation of two hot strip mills with potential capacity of 650,000 tons to 850,000 tons per year will alter considerably the character of the French steel industry and will require considerable rearrangement of existing facilities. As already discussed, the installation of one of the mills at Denain will put that company in a position of giving up all other products, while the nearby steelworks company at the North and East at Valenciennes will concentrate on the production of other steel products.

In the Longwy area a large-scale concentration of steel production is expected to take place. The most urgent need mentioned by the commission is to group together the production units of the works of Mont-Saint-Martin and Chiers, and possibly organize production units at Senelle-Maubeuge with the two former works. The Rehon works, whose production is highly specialized and is well integrated, is to be omitted from the plan in question.

As regards coking plants and power stations, a large-scale plan for concentration is provided. It will be put into effect by the erection of a power station at Herserange, and development of the existing coking plant at Mont-Saint-Martin to a capacity of 1600 tons per day.

The Micheville works, which is quite isolated from the foregoing, will not undergo any far-reaching change, unless it be an increase in its output capacity for pig iron and the specialization of its rolling mills on standardized products. It would also appear that bearing in mind a possible connection between the blast furnace gas systems of Arbed, Audun-le-Tiche and Aubrives-Villerupt, the existing coking plant might be expanded to about the capacity of 1600 tons.

In the Knutange works, in the Fentsch River Valley, one problem remains—that of concentrating the two groups of blast furnaces to form a single one.

The future of the Hayange works is entirely dependent on the choice of the site for setting up the eastern strip mill. A number of solutions have been given consideration: Modernization of existing installations without the strip mill, modernization and rationalization with the strip mill, elimination of all production other than for flat products with the strip mill. It is in this valley that a 5-stand tandem mill is to be built for making tinplate.

The case of the Homecourt works in the Orne valley will be taken up again as soon as a definite balance of commercial rolled products is possible. The whole of the works of Joeuf and Moyeuvre will be reviewed by the establishments concerned on the basis of a possible merger of the two works. The case of the Rombas works does not raise any serious difficulties, owing to the

NOT PRETTY BUT POTENT: *New French diesel-electric locomotive for the Paris-Lyon line. Rated at 4200 hp, it can haul 450 tons at 80 mph. French sources say it will replace six steam engines.*

specialization of the existing mills.

In the valley of the Moselle the program under consideration for the Thionville and Hagondange works is like that for Hayange, dependent on the site of the hot strip mill. Nevertheless, it would seem that if the strip mill is installed at Thionville, it will take the place of the old products, which will be produced at the Hagondange works.

An important question is pending solution as regards the two works of Neuves-Maisons and Pompey in the Nancy area. Industry officials have been asked to determine to what extent steel production could be concentrated on the actual site of the Neuves-Maisons works, the special products of Pompey being included in the framework of a large, modern production unit specializing in the production of carbon steel in openhearth furnaces.

The Dunes works on the coast is not to resume pig iron production, and is considering specializing in mounted axles and engineering work. The commission was unanimous in that the Trignac works should be kept closed and such material as can be used recovered. On the other hand the Mondeville works, which is the only one situated on the Normandy ore deposit, should be reconstructed.

The works in the center of France differ essentially from the works in the north and east. Dispersion among too great a number of units is the essential characteristic of siderurgy in the center in its present state. Most of the works in this region are too small to be practicable. The commission therefore proposes a vast program of regrouping. In particular it has considered the setting up of production groups, the chief of which would be:

(1) The Center, comprising Creusot, Guegnon, Montlucon, Commentry.

(2) The Loire, with Assailly, Saint-Chamond, Firminy, Marrel and Saint-Etienne.

(3) The Alps, extending to Allevard-le-Cheylas, Bonpertuis, Saint-Michel-de-Maurienne, Ugine-Moutiers.

(4) The Pyrenees, with le Boucau, Pamiers, Toulouse.

In the first two groups, at least a rationalization of their products is possible, provided that technically the works in each of these groups are combined under one authority, and that from the financial angle, a pooling of results enables the best solution to be sought, without restricting the possibilities of rationalization by the need for each works to maintain its own profits.

Conclusions.

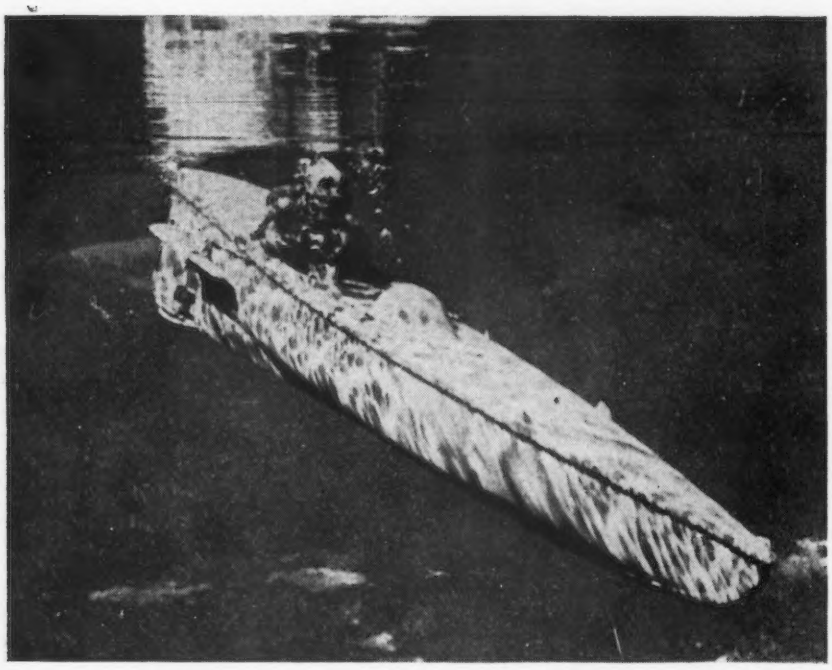
The effective staffs of the steelworks today total slightly over 91,000 workmen, more than sufficient to consume the fuel quotas available. This staff will be adequate up to a production level of about 650,000 tons per month, but thereafter a labor shortage will prevail. According to present estimates, the ultimate manpower need for the industry, if the plan as outlined by the commission is fulfilled, will be for a total of 160,000 workmen.

Although precise estimates of the investment required for carrying out the modernization plan must wait the detailed equipment specifications, a broad outline of costs in billions of francs and millions of dollars based on May 1946 price levels has been made:

	Billion Francs	Million
Coking plant	5.5	($45.8)
Agglomerations	3.6	($30.0)
Blast furnaces	12.0	($100.0)
Thomas steelworks	1.0	($8.3)
Openhearth steelworks	1.6	($13.2)
Electrical equipment	11.1	($92.5)
Rolling mills	21.2	($176.6)
Sundry	8.0	($66.6)
Workers' dwellings	6.0	($50.0)
Total	70.0	($583)

The expenditure of these sums

NO PICNIC: *During the war a group of British seamen made a number of canoe trips in waters quite unsuitable for canoeing. Taking the wraps off one of the war's most closely guarded secrets are these photos which tell the story of the men of the M.S.C. (Motorized Submersible Canoe.) Called the smallest underwater craft in the world, the canoes were taken by torpedo boat or submarine into enemy waters where they attacked shipping in enemy harbors. The pilot, equipped as shown at the right, often spent 10 to 12 consecutive hours in his tiny cockpit in which he could descend to a depth of 50 ft.*



will make it possible to set up the following installations:

Coking plant—the construction of new batteries and the modernization of existing units roughly equal to the construction of nine new batteries capable of 1600 tons consumption.

Sintering—18 works are required.

Blast furnaces—24 entirely rebuilt units are anticipated.

Thomas steelworks — two new Thomas steelworks are being considered.

Openhearths—8 furnaces, 2 of 50 tons and 6 of 80 tons are being considered.

Electrical equipment — 3 joint power stations with a total of 380,000 kw, 4 private power stations totaling 90,000 kw, plus 8 Ilgner sets for blooming mills and rolling mills.

Workers' dwellings — 5000 new units are provided for.

Although a part of the government's plan which is to be completed in 5 years, this overall steel program probably cannot be completed in less than 7 years, and will represent an annual investment of about 10 billion francs ($83.3 million). About two-thirds of this program can be handled by French industry, while the remainder must be imported. The possibility of the allocation of German machinery, including rolling mills and sintering equipment, might make it possible to reduce the total of imports.

The commission predicts that substantial improvement will be noted throughout the various stages of the program, and that the efficiency of the manpower should increase from 48 tons of steel per manyear to 103 tons per manyear in the last stage.

Heating Exposition

(CONTINUED FROM PAGE 113)

chinery Assn.; R. H. Hargrove, first vice-president, American Gas Assn.; A. G. Syska, American Institute of Consulting Engineers; J. R. Edmunds, Jr., president, American Institute of Architects; C. S. Leopold, president, American Society of Refrigeration Engineers; J. M. Frank, Industrial Unit Heater Assn.; Ernest Szekely, president, National Assn. of Fan Manufacturers; E. I. Williams, president, National Mineral Wool Assn.; F. E. Mehrings, president, National Warm Air Heating and Air Conditioning Assn.; W. A. Matheson, president, Oil-Heat Institute of America; Marc A. Bluth, executive secretary, Stoker Manufacturers Assn.; W. R. Stockwell, Institute of Boiler and Radiator Manufacturers; R. M. Getschow, Heating, Piping and Air Conditioning Contractors National Assn.

Other members of the committee are: L. T. Avery, president, Avery Engineering Co.; and John Paul Jones, consulting engineer, president, John Paul Jones, Cary & Millar.

Turns Large Ordnance Depot Over to France

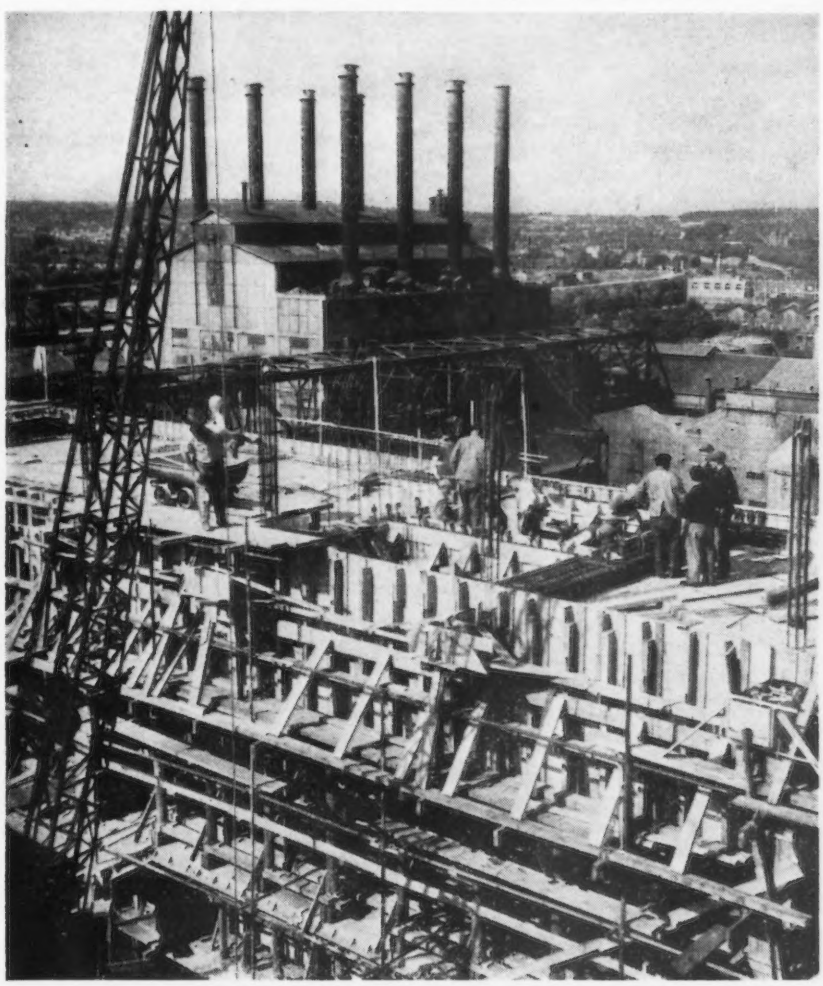
Paris

• • • **The U. S. Army's** largest ordnance depot during the war, known to thousands as Depot 0-644 in Vincennes (see THE IRON AGE, Mar. 14, 1946, p. 115), including millions of dollars worth of surplus Army equipment, was turned over formally to the French Government in December.

All surplus materials in the depot, including 32,000 vehicles of all kinds, 41,173 tons of automotive spare parts, and varying amounts of hardware and hand tools become the property of the French under terms of the Blum-Byrnes bulk agreement for the purchase of all Army surplus property in France, the Office of the Foreign Iiquidation Commissioner said. The vehicles have an original cost of 49,-300,000 and the spare parts were declared at $145,134,000.

The depot, which covers 3700 acres was first taken over by the U. S. Army as an ordnance supply installation in September 1944. During the Allied campaign on the Continent all of the Armies were supplied with ordnance materials from the huge installation. After the cessation of hostilities the depot became one of the Army's largest collecting points for equipment turned in by homeward bound units.

POWER COMING BACK: *A new hydroelectric power station under construction at St. Denis, near Paris where local generating plants will be brought together through a 60-000-kw network. The St. Denis plant is connected to other French power stations through a 220,000-kw network. Soon the St. Denis plant, which supplies much of the electricity for Paris, will have 270,000 kw on tap.*



Army Air Forces Embarks on a New Management Program

Industry Watches with Interest Program That Can Weather Most Critical Analysis

By GENE HARDY
Washington Bureau

o o o

Washington

• • • **Spurred by its** technical and strategic achievements in the use of air power, the Army Air Forces has embarked on a new management program which industry is watching with interest. It is designed "to effect an economy of operation and a pattern of management that will stand up under the most critical and export analysis and pass high standards with regard to economy of production and organizational efficiency."

The program, under the direction of Maj. Gen. Fred L. Anderson, Jr., Assistant Chief of Air Staff, is functioning in AAF shops, warehouses and other installations throughout the continental United States.

Of two approaches to effect this economy of operation, the AAF management program emphasizes the training approach. AAF officials believe that only through competent leadership can a lasting, efficient management pattern be effective and be made to function. These officials point out that "there is too much impact on morale when changes are continually made by outside experts and analysts, and it is common knowledge that survey teams and analysis groups do not leave those in charge at the operating level competent to carry out the proposed changes nor to apply basic principles and procedures to new situations or to new assignments and changes of duties."

The AAF management program is based on the idea that there are some principles of management that approach in definiteness those of physics and chemistry and that there are a set of management functions, a series of palpable foundations of human relations, and a series of procedures for patterning every management action. The program is based on another fundamental idea, and that is that these principles, functions, foundations and procedures are used by every person who is part of management from the commanding general to the noncommissioned officers and civilian supervisors.

"Both top management and first line management need to know and apply these four factors; the only variance is the extent of the personnel or the facilities to which each one applied them," according to officers directly connected with the program.

To carry out this objective, a systematic training program has been established. It reaches all levels and includes in the course for each level the basic principles, functions, foundations and procedures so as to develop skill in the application of them to activities encountered by each segment of management. These courses consist of color chart sets, conference outlines, work sheets, devices and include films and motion pictures.

The second approach in the AAF management program, by which an overall efficiency of operation will be maintained, is through the work of the management and utilization officer and his staff. This officer assists the commander in preparing directives, manuals, and circulars which establish plans and policies for management and utilization activities; supervises the indoctrination of staff officers and operating officials; surveys and analyzes utilization practices and procedures and makes recommendations designed to improve efficiency.

The AAF program is unique in that it provides for a standard nomenclature of management terms and takes out of a maze of laws, theories, corollaries, principles, functions and axioms, a set of down-to-earth practical, applicable principles, functions, foundations and procedures; adopts them universally; and implements them widely through training in the knowledges and skills centered in them.

A basic part of the program embodies the five principles of motion economy: (1) Get the right man on the job; (2) increase his availability for work; (3) stimulate his will to work; (4) increase his capacity to produce; and (5) use him fully on essential tasks. These principles are used in connection with the following 5-step procedure for improving a job or method: (1) Select the job to be improved; (2) make a detailed breakdown of the job; (3) question every detail; (4) develop an improved method; and (5) install the new method.

Briefly, the AAF claims that it is taking the mystery and emotion out of management.

The AAF believes that advance knowledge of a set of standard management concepts by all who are a part of management results in plans from the top finding both understanding and enthusiasm when they reach the first line operating officials. Likewise the implementation of this plan coming from the top can be done aptly and well because there is a continued and more detailed application of the same techniques and principles on the working or operational level.

In the case of training or orienting personnel to new plans and policies so that the acceptance and inauguration will be quick and exact, all explaining and instructing is done in terms of these standard concepts and principles. If disagreement as to plans and procedures or a reluctance to accept them occurs, they are resolved in terms of the principles and foundations and by analyzing the approved procedures.

General Anderson in summarizing this portion of the program told THE IRON AGE: "Much is done for morale when conflicts, either major or minor, are settled in terms of our universally accepted concepts rather than in terms of personalities. No one person or group of persons lose face when a difference is resolved in terms of a principle. It is as simple as a disagreement over the spelling of a word. Reference is made to the dictionary and both know whether they were right or wrong, and if they were wrong,

they spell the word correctly forever after."

In general, it has not been commonly accepted in the field of management that principles and procedures integrated in it have the precision of principles and formulas of exact sciences. However, the AAF does accept them as scientific and precise and claims that experience has proven that application of them results in efficiency and improved morale and that variation from them has a unique way of causing delay, waste and loss.

"One of the most concise ways of evaluating the AAF program," says General Anderson, "is to look concretely at some savings made as a result of the application of the five principles of motion economy and the use of the 5-step procedure in improving a job or method. In one case the concentration of all materials and equipment within the area of the two lowest classifications of motion in a job of inventoring delicate instrument parts resulted in doubling the production of the four operators concerned.

"In a group of noncommissioned officers who were instructed in these same principles and procedures, a series of five improved procedures, aggregating $35,000, resulted.

"Numerous improved organizational charts and duties analyses have resulted from the application of the four principles of management as applied to personnel, and the knowledges and skills centering around the five functions applied by executive personnel AAF have resulted in improved plans, practical time budgets and schedules, and standards of production established within the safe work range. The tempo of production in offices, warehouses and shops has increased and with the increase in tempo a raised and animated morale has developed.

"Many a supervisor way down the line has felt the effects in his attitude of a sincere application of the principle of delegation of authority and the unity of command. This impact on his attitude plus his own training has impelled him to apply them sincerely from himself down, and the workers under his direction have stood a little more erected and saluted or greeted him with vigor and respect. Because a thousand jobs have been screened in terms of the principles of the divisions of accomplishment, 10,000 workers have done more and been less fatigued and have left for the day feeling right."

Personal feelings and attitudes and their effect on production are difficult to measure, but the AAF maintains that the accompanying illustration, which is used in the training program, shows in an irrefutable way how the disregard for such foundations of good relations as "let people know in advance about changes which affect them" and "give credit where due" adversely affect production.

The captions indicate clearly

Industrial Briefs...

• AUTO PARTS PLANT — Allen Industries, Inc., Detroit, has broken ground for a new plant at Rahway, N. J. The firm manufactures automotive products.

• LABOR UMPIRE — John W. Babcock, Detroit attorney and formerly chief assistant U. S. attorney, has been named labor umpire for the Ford Motor Co. and the Foremen's Assn. of America, succeeding Judge W. McKay Skillman, who has resigned.

• DIVISION CHARGES — W. C. Johnson, vice-president in charge of the general machinery division, Allis-Chalmers Mfg. Co., has announced a change in the division's field organization. District offices are to be grouped according to location and similar interests under the direction of regional managers. The regional managers each will have a staff of specialists, and the regions will operate as self-contained field units. The first regional managers who will act as a nucleus for building the first four regional organizations are W. F. Taylor, D. S. Kerr, J. L. Pratt, as well as A. J. Schmitz who will continue in that capacity. Mr. Taylor will supervise the New England area. Mr. Kerr will handle the southeast. The southwest will be supervised by Mr. Pratt, while Mr. Schmitz will continue to direct operations on the Pacific Coast.

• TIMKEN MOVES OFFICE—The main office of Timken Silent Automatic has been moved from Detroit to Jackson. However, the offices of general manager T. A. Crawford and advertising and sales promotion manager R. M. Marberry will remain at Detroit.

• NEW FOUNDRY — The Reedsburg Foundry Co., Reedsburg, Wis., has begun erection of a new plant to produce gray iron and aluminum castings.

• BUYS 56-ACRE SITE — Rheem Mfg. Co. has purchased a 56-acre industrial site from Parr-Richmond Terminal Corp. adjacent to its present drum manufacturing plant in Richmond, Calif., for possible later expansion, according to R. S. Rheem. A modernization and enlarging program is now in progress, and no development work is expected on the new site until present plans have been completed.

• BUYS REFINERY UNIT—Purchase of a refinery unit and facilities at Oil City, Pa., by the Koppers Co., Inc., for $1,230,-125 has been announced by WAA. Koppers is said to be planning to expand an additional $1½ million to convert the plant to full operation in production of alkylate aromatic compounds.

• MORE FARM IMPLEMENTS—J. I. Case Co. at their Burlington, Iowa, plant expect to produce 10,000 combines and 2000 elevators for the year 1947. This planned production is 2½ times better than any previous year and if carried to completion will require 12,000 to 14,-000 tons of steel.

• MOVES SALES OFFICE — Monarch Machine Tool Co., Sidney, Ohio, announces transfer Feb. 1 of its eastern sales office from Newark, N. J., to New York, 8113 Empire State Bldg. N. H. Critton, eastern sales manager, heads a staff including Sam Dansker, in charge of foreign sales; Fred J. Griffis, in charge of domestic sales; Carl Slonkosky, sales engineer and Pete Luma, service manager.

• TO HEAD GROUP—R. G. Farrel, chairman of the board of the Fairmont Aluminum Co. has been elected president of the Aluminum Assn. Mr. Farrel succeeds Charles W. Bohn, president of the Bohn Aluminum & Brass Corp.

the emphasis placed on the personality and individuality of workers in the AAF program of "dynamic instruction." A close look at the mass of workers leaving the plant shows every variation of what the captions imply.

The AAF management program has attracted widespread interest. Personnel from nearly every government agency in the Washington area requested an institute and were trained as instructors in one or more of the standard courses. A corps of officers from the Royal Canadian Air Force was assigned to review the material and adopt it for use in their own training program. Business and industry have also obtained copies of the material whenever possible and have, in some instances, sought the services of individuals who have become skilled in the use of the principles and procedures.

Some Overseas Surplus May Now Be Returned

Washington

• • • **Surplus carbon steel** mill products, aluminum and copper sheets, copper tubes, ferrous and non-ferrous scrap, and many other materials and metals which have been designated in short supply may now be returned to this country from abroad under a State Dept. order just issued.

Effective Jan. 18, the action revises Sec. 33 of the Surplus Property Act so as to lift the ban on importation of surpluses listed in Schedule A of the order. Included in the schedule as it now stands are:

Passenger cars and trucks, including jeeps, automotive parts, batteries, tire chains, and shop maintenance equipment.

Construction machinery and equipment, including cranes, tractors, bulldozers, scrapers, graders and ditchers.

Machinery and allied equipment including conveyor and other belting, engines and hoists, diesel power units, lathes, boring and milling machines, presses, sawmills, pumps and refrigeration equipment, both heavy and commercial.

Electrical equipment and supplies including generators, motors, wire and cable.

Building materials and equipment including cast iron or steel boilers, builders' hardware, wire and screen cloth, pipe fittings and unions, plumbers' cast iron specialties, wiring devices and other miscellaneous items.

In addition, restrictions are lifted on C-47, C-54, and C-45 aircraft and component parts abroad which have not been committed as well as 100 tons of high grade alloy steel sheet bar and 20 tons of phosphor and manganese bronze bar and tubing and copper and monel sheets now located in Canada.

Construction Steel . . .

New York

• • • **The total** estimated bookings of fabricated structural steel for the 12 months of 1946, according to reports received by the American Institute of Steel Construction, amounted to 1,726,057 tons or an increase of 14 pct over the average of 1,509,496 tons booked for the same period in the 5 prewar years 1936 to 1940.

Shipments have shown a gradual monthly increase during the year and have totaled 1,551,607 tons for the 12 months, which is a slight increase over the average reported for the same period in the 5 prewar years, 1,464,626. The tonnage available for future fabrication at Dec. 31 was 646,090 tons.

Following is the complete tabulation of bookings and shipments:

	Estimated Total Tonnage for the Entire Industry 1946	Estimated Total Tonnage for the Entire Industry Avg. 1936-1940
Contracts Closed		
January	235,817	107,578
February	132,707	96,280
March	173,871	124,558
April	128,671	110,783
May	165,290	126,237
June	131,010	125,835
July	137,241	152,481
August	165,590	113,135
September	114,295	137,982
October	142,565*	141,557
November	102,399*	129,757
December	96,601	143,313
Total	1,726,057	1,509,496
Shipments		
January	107,490	92,578
February	63,803	83,626
March	102,803	115,031
April	122,511	123,650
May	124,408	123,225
June	126,850	129,969
July	140,224	127,422
August	157,510	136,389
September	141,933	137,255
October	164,730*	140,944
November	157,274*	127,873
December	142,071	121,664
Total	1,551,607	1,464,626
Tonnage available for fabrication within the next 4 months	646,090	363,288

*Revised.

• • • **Fabricated steel awards** this week included the following:

775 **Tons,** Harrisburg, Pa., diesel locomotive shop for Pennsylvania R.R., to Belmont Iron Works, Philadelphia.

225 **Tons,** Caspar, Wyo., penn stocks for Cortas Power Co. to Darby Products Steel Plate Corp.

• • • **Fabricated steel inquiries** this week included the following:

13,000 **Tons,** Buffalo, N. Y., two veterans' hospitals, one at Buffalo and the other at Albany, U. S. engineers. Proposals will be opened Feb. 6. This substitutes for previous announcement of 6000 tons for Buffalo veterans' hospital.

600 **Tons,** Westchester, N. Y., new Unionport bridge over Westchester Creek, New York Dept. of Highways, due Feb. 5.

500 **Tons,** Harryatt Georges power house for Georgia Power Co.

330 **Tons,** Scottsdale, Ariz., galvanized fabricated structural steel, reservoir, City Clerk, Phoenix, bids to Jan. 28.

300 **Tons,** Tamaqua, Pa., screening plant for Lehigh Navigation Coal Co., due Jan. 27.

300 **Tons,** Chicago, industrial building.

200 **Tons,** Chicago, Santa Fe Railroad commissary.

200 **Tons,** Araby, Ariz., substation.

150 **Tons,** Aboca, Iowa, 110-ft bridge span.

145 **Tons,** Iowa, 1947 bridge requirements for State of Iowa.

145 **Tons,** Chicago, factory for Sherwin Williams Co.

120 **Tons,** Cedar Rapids, Iowa, building for Cherry Burrell Co., abandoned.

100 **Tons,** Denver, warehouse for Firestone Tire & Rubber Co.

• • • **Reinforcing bar inquiries** this week included the following:

3205 **Tons,** Los Angeles, Los Angeles River channel improvement, District Corps of Engineers, Job 47-21, bids to Feb. 25.

1590 **Tons,** Odair, Wash., Grand Coulee Machine Shop, Bureau of Reclamation, Denver Inv. G-38, 189-A, bids to Jan. 29.

685 **Tons,** Lane Co., Ore., Dorene Dam and spillway, U. S. Engineer Office, Portland, bids to Mar. 20 (tentative date).

495 **Tons,** Multnomah Co., Ore., five reinforced concrete structures, Front Ave. section of Pacific Highway, State Highway Commission, Portland, bids to Feb. 4.

240 **Tons,** Los Angeles, undercrossing, Santa Ana Parkway at Soto, California Div. of Highways, Los Angeles, bids to Feb. 20.

165 **Tons,** Butte City, Calif., bridge across Sacramento River, California Div. of Highways, Sacramento, bids to Feb. 19.

120 **Tons,** Urbana, Ill., electrical engineering building, John Felmley, low bidder.

• • • **Pipe awards** this week included the following:

140 **Tons,** Chester, Pa., gas holder for Philadelphia Electric Co., to Bethlehem Steel Co., Bethlehem, Pa.

• • • **Railroad car awards** this week included the following:

The Louisville & Nashville R.R. has placed an order for 1600 hopper cars with Pullman Standard Car Mfg. Co. The Interstate Railroad Co. has ordered 500 50-ton hopper cars to be rebuilt by Virginia Bridge Co. The Chesapeake & Ohio has placed an order for 1000 50-ton box cars and Nickel Plate has ordered 600 box cars from Pullman Standard Car Mfg. Co.

• • • **Railroad car inquiries** this week included the following:

The Baltimore & Ohio R.R. is inquiring for 1000 to 2000 50-ton hopper cars. **The Wabash R.R. Co.** is inquiring for 500 50-ton box cars. **The Detroit, Toledo & Ironton R.R.** is asking for bids on 200 50-ton box cars.

Offers Tool Steel for Sale

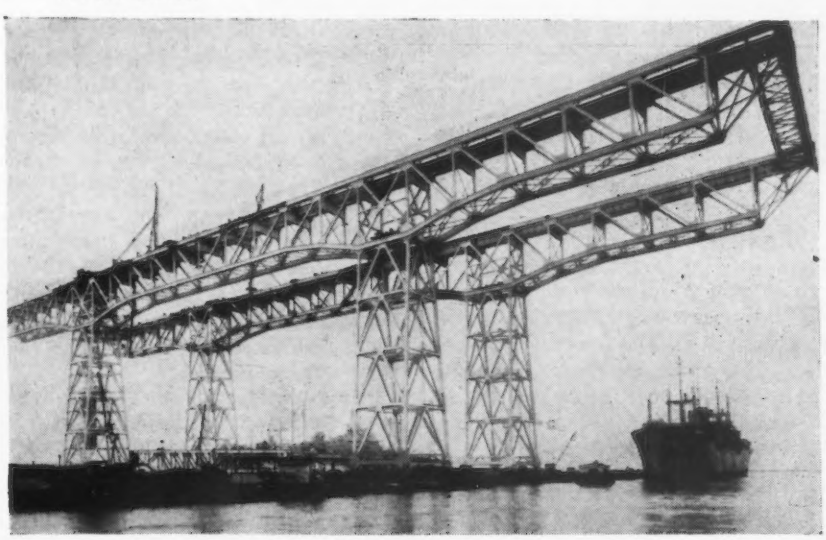
Washington

• • • **Surplus tool steel,** wire rope and aircraft cord which originally cost the government approximately $15½ million is being offered for sale on a competitive bid basis by War Assets Administration.

About $7,500,000 worth (acquisition cost) of the tool steel, produced by well-known manufacturers, is available in the following types: Water hardening, oil hardening, die steel, draw die and finishing, shock resisting, hot work, high speed, drill rod, carbon and high speed.

The wire rope and aircraft cord, including sizable quantities of general purpose ropes, had an original cost of about $8 million. These materials are located in practically all of WAA's regional offices.

FOR A FAST DRAW: *To make Uncle Sam quick on the draw in replacing battleship guns, this huge structure, said to be the world's largest overhead traveling crane is being erected by American Bridge Co., U. S. Steel subsidiary, at Hunter's Point, San Francisco naval shipyard. Guns wear out their rifling after a limited number of rounds and entire turrets are pulled out and replacement turrets dropped into place. The bridge type runway, 207 ft high, extends 162½ ft over the water on each side. A total of 8400 tons of steel went into the runway structure and cranes.*



MACHINE TOOLS

. . . News and Market Activities

Tool Industry Reports Business Quiet and Market Steady

• • • **There has been** very little change in the machine tool industry situation in the last two weeks, although the industry has been the object of more than its usual quota of speculation, including a certain amount penned by some of the more pessimistic pundits.

Business is fairly quiet, and a number of the companies are down to a 4-day week in their shops. Also, and despite the 4-day week, the industry's backlog is being whittled down pretty rapidly, which has led some observers, not members of the industry needless to say, to consign the builders to what amounts to financial oblivion within the next two or three years.

It is a well-known fact that the government-owned surplus has had a highly deleterious effect on the sale of new equipment in recent months, and will doubtless continue to have as long as good machines are available in quantity. One of the biggest worries some builders have at the moment is the tools which are still to come out of war plants and there are plenty of them.

Most observers anticipated a sizable shrinkage of the industry following the finish of the war, but some of this shrinkage has only recenty become apparent. At the start of this year, these same observers predicted that the industry had some six bad months to go. And with prices of new equipment being raised and prices of surplus being reduced, such anticipations are not beyond the pale.

Biggest of the industry's problems, by and large, is the surplus, about which many companies in the industry know far too little as regards their own machines. Second biggest problem, from an intra-industry point of view, is the well-tooled up condition of the country. The idea of obsolescence is an educational problem which must be sold without and to some extent within.

Biggest Problems Are Surplus Government Supplies And Well-Tooled Country

o o o

One machine tool builder, whose position would normally suggest extreme-vulnerability to the surplus, has recently completed a survey showing that during the war years (1940-1945), 25,390 machines were shipped, of which 4574 were exported and 20,816 went into the domestic market, the U. S. and Canada.

Of the 21,816 the survey shows, one-third or 7000 are still on lease, 4500 have been purchased by customers or subsequently purchased at the end of the war by the lessee in possession. In all, 9500 of this builder's machines were declared surplus and about 8000 of these have been declared surplus and resold, leaving about 1500 in government warehouses.

This means, of course, that there are 7000 machines which are potentially surplus, but the company has the important advantage of at least knowing where most of these machines are.

Acme Machine Tool Co. is making a new foot shear for cutting lighter gage steel sheets for the Frederick Iron & Steel Co. of Maryland, which is owned by the same group that controls Acme. Developed by engineers of Frederick Iron & Steel Co., the new shear is now being assembled both at the Maryland plant and the Cincinnati plant. A 10-ft power shear is in process of development and is expected to go into production in the very near future.

Cincinnati sources report business both foreign and domestic is about relatively unchanged with some producers just easing along and orders coming in rather piecemeal.

In Boston, firms which in closing days of 1946 reported almost no new business and quotations outstanding today are more optimistic. They have made limited sales this month and are beginning to develop prospects. Among others, domestic sales are slow but on the whole a little better than anticipated.

Demand for both skilled and unskilled labor by metalworking concerns is on the up again. Tool operators are desired most. Machine tool makers, however, are not in the labor market as a rule. The status of the surplus equipment situation is, they report, a sobering influence. Government is having its difficulties in disposing of surplus equipment, however, and has started public auction in addition to private sales in the hope of reducing inventories.

Directors of the National Tool & Die Manufacturers Assn. held their first quarterly meeting of the year Jan. 24-25, in Cleveland. Sessions of the committee on business conduct, fact-finding, government relations, industrial relations, and membership, were held on the afternoon of the 24th. The latest report for the NTDMA monthly business trends survey indicates that fourth quarter special tooling volume was ahead of the previous year. The survey shows the sharp gain in sales invoiced in November 1946, when compared with the year previous appeared to insure a fourth quarter volume that would run substantially ahead of the same quarter in 1945.

The excellent showing in November of 1946, at 122 pct of November 1945, followed lesser gains in the two preceding months, which were 106 pct and 105 pct respectively, of the previous year's figures. For the first 11 months of 1946, sales invoiced were 81 pct of those for 1945 when war demands of course were responsible for a heavy volume until after VJ-Day.

When precision equipment calls for LOW EXPANSION CAST IRON...

SPECIFY MINOVAR

TRADE MARK

...1/3 THE EXPANSION OF CONVENTIONAL CAST IRONS

Minovar is a nickel alloyed cast iron that successfully minimizes dimensional changes in precision equipment, even under wide temperature changes.

Accuracy of machine tools, dies, instruments, gages and similar devices may be effectively increased by using this low expansion iron for spindle carriers, work mounts, bridges and other cast parts requiring dimensional constancy within tolerances as low as 0.0001".

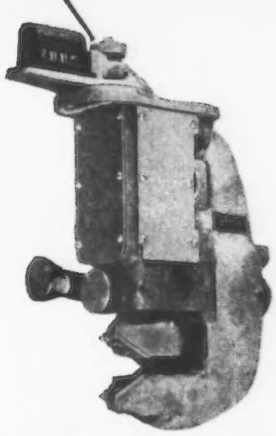
Minovar has a linear coefficient of thermal expansion approximately one-third that of plain cast iron. It surpasses gray iron in toughness and is comparable in vibration damping capacity, gall resistance and machinability.

Large or small, simple or intricate cast forms may be produced in Minovar about as readily as you produce gray iron castings.

We invite consultation on the use of Minovar nickel cast irons. Send us details of your problems for our recommendations.

MINOVAR INCREASES MACHINE TOOL PRODUCTIVE TIME

Need for warm-up before precision machine tool jobs can be set, and need for frequent readjustment during operation, cause production delays. The Heald Machine Company, builders of precision boring and grinding machines, found a solution to this problem by specifying Minovar for cast components requiring maximum dimensional stability to produce work accurate to a few ten-thousandths.



MINOVAR CASTING PERMITS FASTER PRODUCTION OF STRIP STEEL

Strip thickness in ten-thousandths are reliably indicated with the Pratt & Whitney Electrolimit Continuous Gage shown in inset, allowing rolling speeds to reach 3500 feet per minute as against a 300 maximum with hand measuring. Main gage head casting dimensional variation due to thermal changes must be held to the absolute minimum, hence this important part is cast in low expansion Minovar cast iron.

Over the years, International Nickel has accumulated a fund of useful information on the selection, fabrication, treatment and performance of alloys containing Nickel. This information and data are yours for the asking. Write for "List A" of available publications.

EMBLEM OF SERVICE

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THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

NONFERROUS METALS

. . . News and Market Activities

Canada's Metals Use Far Exceeds Prewar

Ottawa

• • • **H. McLeod,** Chief of the Mining, Metallurgical and Chemical Statistical Division of the Dominion Bureau of Statistics, in an address to members of the Canadian Institute of Mining and Metallurgy here presented figures on Canada's consumption of refined metals. Mr. McLeod pointed out that in the year just before the war, about 20,000 tons of refined zinc was used by Canadian industry. During the war the figure rose to a peak of 80,000 tons and is currently running at about 60,000 tons per year, or three times the prewar figure.

In 1946 about 60 pct of the country's refined lead was exported and 40 pct was sold to domestic consumers. The use of lead in the Dominion continues at extraordinary high levels. In the period 1935-39, the average was about 25,000 tons; in 1946 it was more than 60,000 tons, or as great as at any time during the war.

Copper consumption in Canada, prewar at 57,000 tons, represented approximately 25 pct of the output of refined metal. During war years it increased to a peak of about 70 pct, and in the past year it was about 45 pct or 76,000 tons.

•

Sell Jap Cobalt, Mercury

Washington

• • • **The United States** Commercial Co., RFC subsidiary, expects early receipt of 61 metric tons of cobalt and 100 metric tons of mercury from Japan, pursuant to arrangements with the Dept. of State and the Supreme Commander for the Allied Powers for the handling of Japanese exports.

The cobalt, in rondelles, was produced by Union Miniere Du Haut Katanga and is expected to analyze as follows: Cobalt, 97.40 min; nickel, 0.28; copper, 0.01; iron, 0.09; manganese, 0.06; sulfur, 0.01.

The mercury, reported to be of 99.9 pct purity, is in 2900 flasks, having an approximate capacity of 0.17 cu ft. Eighteen hundred flasks are Italian mercury and 1100 flasks, Japanese mercury.

Persons interested in purchasing either metal may advise United States Commercial Co., Washington 25, D. C., prior to Feb. 5.

•

Nicaro Nickel Continues

New York

• • • **The War Assets** Administration has extended the time limit for disposal of the Cuba plant for the production of nickel to Mar. 31 from the previous deadline of Jan. 31. In the meantime Nicaro Nickel Co., wartime operator, is continuing with the production and sale of nickel oxide for alloying in the form of 50 lb bags of metal content.

•

Lead

• • • **Consumers may** expect some improvement in supplies based on the production now coming out of western mines under the longer work week. One producer reports January sales to be the best month since last February. The Office of Metals Reserve has reported that government lead stocks at the end of the year totaled 47,489 tons, of which 45,493 tons is refined metal.

Nonferrous Metals Prices

Cents per pound

	Jan. 22	Jan. 23	Jan. 24	Jan. 25	Jan. 27	Jan. 28
Copper, electro, Conn.	19.50	19.50	19.50	19.50	19.50	19.50
Copper, Lake, Conn.	19.625	19.625	19.625	19.625	19.625	19.625
Tin, Straits, New York	70.00	70.00	70.00	....	70.00	70.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	12.80	12.80	12.80	12.80	12.80	12.80

Canada Increases Its Domestic Ceilings

Toronto

• • • **Donald Gordon,** Director of Wartime Prices and Trade Board, has announced increases in Canadian ceiling prices on copper, lead and zinc, as well as in nonferrous scrap materials in these groups. The following table shows a comparison of Canadian base metal prices under the new ceiling, the old ceiling and in the world markets in cents per pound:

	New Ceiling	Old Ceiling	World Markets
Copper	16.625	11.50	19.50—20.50
Lead	10.625	5.00	12.00—12.50
Zinc	10.25	5.75	11.50—12.70

In addition to higher prices in new metals new maximum selling prices have been established for nonferrous scrap metals. No. 1 heavy copper formerly quoted at 10.65¢ is now 15.40¢; heavy yellow brass is up from 6.65¢ to 9.60¢; No. 1 red brass turnings from 8.90¢ to 10.85¢ new zinc clippings from 4.15¢ to 7.70¢; zinc dross from 3.20¢ to 5.60¢; soft lead from 4.55¢ to 9.60¢; hard lead from 4.05¢ to 8.25¢; battery plates from 2.65¢ to 5.45¢; battery plates (minus posts and strap) from 2.55¢ to 5.20¢ and whole batteries each from 59¢ to 95¢.

In announcing the increased prices, Mr. Gordon admitted hoarding by speculators, reduced quantities for export markets and increased costs to the mines. Simultaneously an increase in the price of antimony was announced from 17½¢ to 29½¢.

•

Zinc

• • • **Zinc consumers** continue unable to fulfill their requirements in some grades. However, it is unlikely that a price rise may be in prospect at this time in view of the competitive situation with respect to die casting metal.

The American Zinc, Lead & Smelting Co. will announce price increases on zinc oxide effective Feb. 1. American Process—lead free will be raised to 9.50¢, French Process to 11.75¢, 35 pct leaded 11.00¢ per lb.

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point (min. 10,000 lb) 15.00
Aluminum pig, f.o.b. shipping point 14.00
Antimony, American Laredo Tex.. 28.25
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be.....$14.75
Beryllium aluminum, 5% Be; dollars per lb contained Be.....$27.50
Cadmium, del'd $1.50
Cobalt, 97-99% (per lb)...$1.50 to $1.57
Copper, electro, Conn. Valley 19.50
Copper, lake, Conn. Valley 19.625
Gold, U. S. Treas., dollars per oz..$35.00
Indium, 99.8%, dollars per troy oz.. $2.25
Iridium, dollars per troy oz. $125.00
Lead, St. Louis 12.80
Lead, New York 13.00
Magnesium, 99.8 + %..... 20.50
Magnesium, sticks, carlots 36.00
Mercury, dollars per 76-lb flask, f.o.b. New York.....$88 to $90
Nickel, electro, f.o.b. New York.... 37.67
Palladium, dollars per troy oz.....$24.00
Platinum, dollars per troy oz...$58 to $61
Silver, New York, cents per oz.... 70.75
Tin, Straits, New York..... 70.00
Zinc, East St. Louis 10.50
Zinc, New York 11.005
Zirconium copper, 6 pct Zr, per lb contained Zr .....$ 6.00

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot
No. 115 ..... 20.50
No. 120 ..... 20.00
No. 123 ..... 19.50
80-10-10 ingot
No. 305 ..... 23.50
No. 315 ..... 22.00
88-10-2 ingot
No. 210 ..... 25.75
No. 215 ..... 24.75
No. 245 ..... 21.75
Yellow ingot
No. 405 ..... 16.25
Manganese Bronze
No. 421 ..... 18.25

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:
0.30 copper, max. 18.25
0.60 copper, max. 18.00
Piston alloys (No. 122 type) 16.75—17.00
No. 12 alum. (No. 2 grade) 16.50—16.75
108 alloy ..... 16.50—16.75
195 alloy ..... 16.75—17.50
AXS-679 ..... 16.50—16.75
Steel deoxidizing aluminum, notch-bar, granulated or shot.
Grade 1—95 pct-97½ pct .. 16.75—17.00
Grade 2—92 pct-95 pct .... 16.25—16.50
Grade 3—90 pct-92 pct .... 15.75—16.00
Grade 4—85 pct-90 pct .... 15.25—15.50

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed
Cast, oval, 15 in. or longer..... 34⅞
Electrodeposited 28⅝
Rolled, oval, straight delivered.. 29⅛
Curved, 18 in. or longer, delivered 29⅛
Brass, 80-20, frt allowed
Cast, oval, 15 in. or longer 31⅝
Zinc, Cast, 99.99 ..... 18¾
Nickel, 99 pct plus, frt allowed
Cast 51
Rolled, depolarized 52
Silver, 999 fine
Rolled, 1000 oz lots, per oz..... 75

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum..... 34.00
Copper sulphate, 99.5, crystals, bbls 7.75
Nickel salts, single, 425 lb bbls, frt allowed 14.50
Silver cyanide, 100 oz lots, per oz 74.5
Sodium cyanide, 96 pct, domestic, 100 lb drums 15.00
Zinc cyanide, 100 lb drums..... 33.00
Zinc, sulphate, 89 pct, crystals, bbls, frt allowed ..... .0635

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier: 2S, 3S, 21.2¢; 52S, 24.2¢; 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢ 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 39.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18: 2S, 3S, 33.5¢; 56S, 39.5¢: 10,000 lb base; B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16: 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb, f.o.b. mill)

Sheet and Plate: Ma, FSa, ¼ in.,54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, $1.25-$1.31; 24, $1.71-$1.75. Base quantity, 30,000 lb.

Round Rod: M, diam in. ⅛, 55¢; ¼, 47¢; ⅜, 46¢; ½, 45¢; ¾, 44¢; 1¾, 43.5¢; 2, 42.5¢; 3, 41.5¢; 4, 42.5¢ 5, 43.5¢; 6 & 7 in., 44¢. Base price, 5000-10,000 lb.

Square and Hexagonal Bar: M, diam in. ⅛, 58¢; ¼, 50¢; ⅜, 48¢; ½, 47.5¢; ¾, 46.5¢; 1¾, 45.5¢; 2, 44.5¢; 3, 43.5¢; 4 & 5 in. 44.5¢; 6 & 7 in., 45¢. Base quantity, 5000-10,000 lb.

Tubing: Varies with wall thickness and outside diameter.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets	..	41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	..	31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l. 15.50
Ribbon, ton lots 14.50
Plates
Small 13.25
Large, over 12 in. 14.25
Lithographic, ungrained 17.25

Copper, Brass, Bronze

(Cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	30.78	....	30.93
Copper, hot-rolled...	....	27.28	....
Copper, drawn	....	28.28	....
Low brass, 80 pct...	37.52	28.71	29.02
High brass	36.03	27.22	27.53
Red brass, 85 pct ..	38.03	29.22	29.53
Naval brass	27.50	26.25	32.19
Brass, free cutting..	....	22.28	....
Commercial bronze..	39.06	30.25	30.56
Manganese bronze ..	31.07	29.57	35.69
Phosphor bronze, 5 pct		49.07	48.82
Muntz metal	27.19	25.94	30.38
Everdur, Herculoy			
Olympic, etc.	34.45	34.73	35.79
Nickel silver, 5 pct..	....	38.11	36.34
Architectural bronze.	26.01	....	....

Scrap Metals

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Brass Mill Scrap

(Lots of 15,000 lb or less)

Cartridge brass turnings 12⅞
Loose yellow brass trimmings.....13¾

Copper and Brass

No. 1 heavy copper and wire..15 —15½
No. 2 heavy copper and wire..14 —14½
Light copper .....13 —13¼
Auto radiators (unsweated)..10¾—11¼
No. 1 composition .....14 —14½
No. 1 composition turnings...13½—14
Clean red car boxes.....10½—11
Cocks and faucets .....12¼—12½
Mixed heavy yellow brass.... 8¾— 9
Old rolled brass ..... 8¾— 9
Brass pipe .....11½—11¾
New soft brass clippings.....11½—11¾
Brass rod ends .....11½—11¾
No. 1 brass rod turnings.....11¼—11½

Aluminum

Alum. pistons with struts .... 4½— 5
Aluminum crankcases ..... 8¼— 8½
2S aluminum clippings ..... 8¼— 8½
Old sheet & utensils ..... 8 — 8¼
Mixed borings and turnings.. 3 — 3⅛
Misc. cast aluminum ..... 7½— 8
Dural clips (24S) ..... 6 — 6½

Zinc

New zinc clippings ..... 7 — 7½
Old zinc ..... 5¼— 5¾
Zinc routings ..... 3 — 3⅛
Old die cast scrap ..... 3 — 3¼

Nickel and Monel

Pure nickel clippings .....21 —22
Clean nickel turnings .....17 —18
Nickel anodes .....19½—20½
Nickel rod ends .....20 —21
New Monel clippings .....14 —15
Clean Monel turnings .....10 —11
Old sheet Monel .....12 —12½
Old Monel castings .....10 —11
German silver clippings, mixed10½—11
German silver turnings, mixed 7 — 7¼

Lead

Soft scrap lead .....11 —11½
Battery plates (dry) ..... 6¼— 6½

Miscellaneous

Block tin 60
No. 1 pewter .....46 —48
No. 1 auto babbitt .....36 —37
Mixed common babbitt .....12 —12½
Solder joints .....13½—14
Siphon tops 38
Small foundry type .....15 —15½
Monotype .....12½—13
Lino and stereotype .....12 —12½
Electrotype .....10 —10½
New type shell cuttings (nom.)12 —12½
Clean hand picked type shells. 5½— 6
Lino and stereo dross ..... 6 — 6½
Electro dross ..... 4 — 4½

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect. Freight equalized with nearest free delivery point.

Full lead sheets 16.25
Cut lead sheets 16.75
Lead pipe, manufacturing point.... 15.50
Lead traps and bends.....List +38%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules.....List +38%
Lead wool 17.50

SCRAP

Heavy Melting Steel Prices Rise Again

New York

• • • **Strong demand** for material to maintain steelmaking operations at a postwar peak, coupled with resistance to higher prices, put the scrap market through some weird gyrations during the past week. The primary result was the posting of several postwar highs in heavy melting steel prices.

Efforts by large industrial scrap generators and most eastern railroads to combat rising prices went side by side with desperate measures by scrap starved mills. The result was a decline in railroad specialty scrap prices in Pittsburgh but a booming heavy smelting steel market in New York, Boston and Buffalo. Gains included a $1.00 advance in heavy openhearth steel at New York and a $3.00 jump in Buffalo.

There is little doubt, according to trade sources, that the earmarking of scrap prevents a true reflection of the current market prices, but the practice may have an anti-inflationary effect, it was said. The Chesapeake & Ohio and other eastern roads have been ignoring high bids and selling at or below the market. But these restrictive tendencies were not enough to halt the rise this week though it is said that they have undoubtedly held down the overall average cost of steelmaking scrap because substantial tonnages are moved under these anti-inflationary measures.

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PITTSBURGH—Despite the trimming of prices on railroad specialties, based on the sale of Pennsylvania Railroad's scrap, there is no weakness in the market in this area. Even last week it was difficult to understand how the mills could hold prices in the face of the bullishness in other trading areas. There is some remote scrap moving into the district at over the price for openhearth grades. Yards here are cutting all rail to cupola size (18-in., and smaller) and completely ignoring the openhearth sizes of 3 ft and under. The price on the 18-in. material is $2 higher than that commanded by the longer rails. In the face of higher prices due to strong demand some buyers have been forced out of the market by price.

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CHICAGO—Despite bullish and bearish trends being reported simultaneously from various sources, the price of openhearth scrap remained the same in this area last week. Some of the buyers of rerolling rails who paid high prices on conversion deals have suddenly found some of the material on their hands with no takers. Cast iron and mixed borings are not in such heavy demand at the last prices and these items show signs of weakness, although no large purchases have been consummated at lower prices. Some foundries formerly forced to pay high prices for cast have now refused to continue at the high level. One foundry reports that their February allocation of pig iron was substantial enough that they can resist the present market level, although the cast demand is enough in some quarters to move what high priced material there is available.

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PHILADELPHIA — While the market here continues strong, there is no evidence of the price advance in heavy melting grades recently reported from other districts. Cast prices have been advanced $1 although there are reports that some transactions have taken place at still higher prices. It is reported that in view of the pig iron and cast scrap shortage some foundries are buying cast iron pipe for remelting. The steel scrap price does not reflect higher prices reported in connection with tie-in sales. Scrap volume is said to be adequate to meet mills' current requirements.

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NEW YORK—Confusion reigned here this week as the price of heavy melting steel advanced another $1 to a top price of $28.50. Brokers were said to be willing to pay $29 for tonnages but early this week only carload lots were offered. The lighter grades were up fractionally in most sales but the sale of 250 tons of unbundled Navy Yard press scrap at $26.56 was a shock to most of the trade. A Navy Yard sale of 2000 tons of "unprepared steel scrap" went at $29.56, with reports conflicting as to the amount, if any, of nonferrous metal in the lot. Shipments were reported good over the past week.

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DETROIT—Publication of scrap lists here has been omitted again this month, indicating the heavy volume of scrap that is moving under allocation rather than by awards based on price. The price of scrap bought in the open market remains unchanged but it is known that the price under allocation agreements is generally lower than the open market quotation. The right to reject scrap which was permitted to lapse in many cases while scrap was extremely tight has been reinstated for some time in the case of steel scrap and is again being enforced in some foundry contracts. Some scrap appears to be coming in from southern states and a 1000 ton shipment of foundry grades has been received here from Texas, it is reported.

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CLEVELAND—With the market here thin and jittery, reports of purchases of remote scrap are tending to push quoted prices up, although mills are still hewing to the $32 price. In some spots, the situation is the worst yet, and probably the only preventive of further price increase would be a drop in steel making operation to about 80 pct by the entire industry. Shipments to mills are only fair and the tie-in sales are not helping the situation any.

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BOSTON—Heavy steel generally is $27 a ton, up $1 for the week. That price has been paid for Worcester as well as eastern and western Pennsylvania shipment. Business is active but not as much so as a week ago. How much money brokers make on $27 scrap is problematical because current buying is often short covering and tie-in sales are frequent. Chemical borings are established on a $23 a ton basis. No sales of stove plate at less than $45 a ton are reported and as high as $50 has been paid for heavy cast.

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BUFFALO — Openhearth scrap was strong this week with prices in that section of the list beginning to resemble the prewar pattern. Brokerage sales of number one heavy melting at $32 were followed by business in No. 2 heavy melting and No. 1 bundles at $31, establishing a $1 differential and representing a $2 advance for the latter items. No. 2 bundles were unchanged at $3 under the top grade. Most of these transactions were reported to be in 500-ton lots. Blast furnace items were advanced $1 a ton and most railroad listings were up $1 to $2. The higher prices however failed to bring a corresponding increase in the general movement.

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BIRMINGHAM—Special foundry steel grades which are in limited supply here have advanced approximately $2 per ton. There is no price change for other types of material although cast and blast furnace grades are very scarce and movement of openhearth grades is not keeping up with demand.

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CINCINNATI — A small improvement in flow of scrap is reported amid indications that prices have now reached the peak. Some melters indicate a fair supply on hand and are resisting too broad an expansion of inventory. Openhearth grades are still in strong demand, but melters resist price advances strenuously.

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TORONTO—Supply here is steadily becoming more critical and output from domestic sources is only a small part of consumer requirements. While some dealers believe that an increase in ceiling prices would tend to bring out more scrap, others state there are no large accumulations of steel or iron scrap in the country. One large Ontario consumer stated that his firm has been bringing in scrap from England, Holland and Australia, to meet steelmaking requirements, and at present was using old barbed wire from England that had been cleaned off the beaches since the close of the war.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$32.00 to $32.50
RR. hvy. melting	32.00 to 32.50
No. 2 hvy. melting	32.00 to 32.50
RR. scrap rails	38.00 to 39.00
Rails 3 ft. and under	40.00 to 41.00
No. 1 comp'd bundles	32.00 to 32.50
Hand bdld. new shts.	32.00 to 32.50
Hvy. axle turn.	32.00 to 32.50
Hvy. steel forge turn.	32.00 to 32.50
Mach. shop turn.	26.50 to 27.00
Short shov. turn.	28.00 to 28.50
Mixed bor. and turn.	27.50 to 28.00
Cast iron borings	27.50 to 28.00
No. 1 cupola cast	40.00 to 41.00
Heavy breakable cast	36.00 to 37.00
Malleable	40.00 to 41.00
RR. knuck. and coup.	36.00 to 36.50
RR. coil springs	36.00 to 36.50
Rail leaf springs	36.00 to 36.50
Rolled steel wheels	36.00 to 36.50
Low phos.	36.00 to 36.50

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$29.50 to $30.00
No. 2 hvy. melting	29.50 to 30.00
No. 1 bundles	29.50 to 30.00
No. 2 dealers' bndls.	29.50 to 30.00
Bundled mach. shop turn.	29.50 to 30.00
Galv. bundles	27.50 to 28.00
Mach. shop turn.	24.50 to 25.00
Short shovels, turn.	26.50 to 27.00
Cast iron borings	24.50 to 26.00
Mix. borings & turn.	24.50 to 25.00
Los. phos. hvy. forge	33.50 to 36.00
Low phos. plates	32.50 to 35.00
No. 1 RR. hvy. melt.	30.50 to 31.00
Reroll rails	33.50 to 34.50
Miscellaneous rails	38.00 to 40.00
Angles & splice bars	39.00 to 39.50
Locomotive tires, cut	37.00 to 37.50
Cut bolster & side frames	35.50 to 36.00
Standard stl. car axles	39.00 to 39.50
No. 3 steel wheels	36.50 to 37.00
Couplers & knuckles	33.00 to 35.00
Malleable	43.50 to 45.00
No. 1 mach. cast	43.50 to 45.00
Rails 2 ft. and under	43.00 to 45.00
No. 1 agricul. cast	38.00 to 38.50
Hvy. breakable cast	38.00 to 38.50
RR. grate bars	35.00 to 36.00
Cast iron brake shoes	35.00 to 36.00
Stove plate	36.00 to 38.50
Clean auto cast	37.00 to 40.00
Cast iron carwheels	35.75 to 37.00

CINCINNATI

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

No. 1 hvy. melting	$28.50 to $29.00
No. 2 hvy. melting	28.50 to 29.00
No. 1 bundles	28.50 to 29.00
No. 2 bundles	28.50 to 29.00
Mach. shop turn.	23.50 to 24.00
Shoveling turn.	24.50 to 25.00
Cast iron borings	23.50 to 24.00
Mixed bor. & turn.	23.50 to 24.00
Low phos. plate	30.50 to 31.00
No. 1 cupola cast	33.00 to 35.00
Hvy. breakable cast	31.00 to 33.00
Stove plate	28.00
Scrap rails	26.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$26.50 to $27.00
No. 2 hvy. melting	26.50 to 27.00
Nos. 1 and 2 bundles	26.50 to 27.00
Busheling	26.50 to 27.00
Turnings, shovelings	22.50 to 23.00
Machine shop turn.	20.50 to 21.00
Mixed bor. & turn.	20.50 to 21.00
Cl'n cast. chem. bor.	23.00
No. 1 machinery cast	40.00 to 45.00
No. 2 machinery cast	40.00 to 45.00
Heavy breakable cast	45.00 to 50.00
Stove plate	40.00 to 45.00

DETROIT

Per gross, ton, brokers' buying prices, f.o.b. cars:

No. 1 hvy. melting	$26.75 to $27.25
No. 2 hvy. melting	26.75 to 27.25
No. 1 bundles	26.75 to 27.25
New busheling	26.75 to 27.25
Flashings	26.75 to 27.25
Mach. shop turn.	19.75 to 20.75
Short shov. turn.	21.75 to 22.25

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Pending establishment of a market in some districts and in certain grades, the former OPA ceiling price is inserted for reference, followed by an asterisk.

Cast iron borings	$21.25 to $21.75
Mixed bor. & turn.	20.75 to 21.25
Low phos. plate	29.25 to 29.75
No. 1 cupola cast	41.25 to 44.25
Hvy. breakable cast	37.25 to 39.25
Stove plate	37.25 to 39.25
Automotive cast	nominal

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$30.50 to $31.50
No. 2 hvy. melting	30.50 to 31.50
No. 2 bundles	30.50 to 31.50
Mach. shop turn.	23.00 to 24.00
Shoveling turn.	25.00 to 26.00
Mixed bor. & turn.	23.00 to 24.00
Clean cast chemical bor.	29.00 to 30.00
No. 1 cupola cast	43.00 to 45.00
Hvy. breakable cast	42.00 to 43.00
Cast. charging box	42.00 to 43.00
Clean auto cast	43.00 to 45.00
Hvy. axle forge turn.	31.50 to 32.50
Low phos. plate	35.00 to 36.00
Low phos. punchings	35.00 to 36.00
Low phos. bundles	32.50 to 33.50
RR. steel wheels	36.50 to 37.50
RR. coil springs	36.50 to 37.50
RR. malleable	44.00 to 45.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$28.25 to $28.75
Bundled sheets	28.25 to 28.75
Mach. shop turn.	23.25 to 23.75
Locomotive tires, uncut	30.00 to 31.00
Misc. std. sec. rails	33.00 to 35.00
Rerolling rails	40.00 to 42.00
Steel angle bars	35.00 to 37.00
Rails 3 ft. and under	35.00 to 37.00
RR. springs	39.00 to 41.00
Steel car axles	32.00 to 33.00
Stove plate	32.00 to 33.00
Grate bars	30.00 to 32.50
Brake shoes	32.00 to 33.00
Malleable	40.00 to 42.00
Cast iron carwheels	35.00 to 36.00
No. 1 machinery cast	36.00 to 38.00
Breakable cast	25.00 to 27.50

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$27.00 to $27.50
No. 2 hvy. melting	27.00 to 27.50
No. 2 bundles	27.00 to 27.50
No. 1 busheling	27.00 to 27.50
Long turnings	17.00 to 18.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	17.00 to 18.00
Bar crops and plate	31.00 to 32.00
Structural and plate	31.00 to 32.00
No. 1 cast	34.00 to 35.00
Stove plate	30.00 to 35.00
Steel axles	29.00 to 30.00
Scrap rails	28.00 to 29.00
Rerolling rails	30.00 to 31.00
Angles & splice bars	32.00 to 33.00
Rails 3 ft & under	32.00 to 33.00
Cast iron carwheels	29.50 to 30.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$32.00 to $32.50
No. 2 hvy. melting	32.00 to 32.50
Low phos. plate	34.00 to 34.50
No. 1 busheling	32.00 to 32.50
Hydraulic bundles	32.00 to 32.50
Mach. shop turn.	26.50 to 27.00
Short. shovel, turn.	27.50 to 28.00
Cast iron borings	27.50 to 28.00
Elec. furnace punch	34.00 to 34.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$27.50 to $28.50
No. 2 hvy. melting	27.50 to 28.50
Comp. black bundles	27.50 to 28.50
Comp. galv. bundles	25.50 to 26.50
Mach. shop turn.	21.50 to 22.00
Mixed bor. & turn.	21.50 to 22.00
Shoveling turn.	23.50 to 24.00
No. 1 cupola cast	39.00 to 40.00
Hvy. breakable cast	39.00 to 40.00
Charging box cast	$39.00 to $40.00
Stove plate	39.00 to 40.00
Clean auto cast.	39.00 to 40.00
Unstrip. motor blks.	36.00 to 38.00
Cl'n chem. cast bor.	24.00 to 25.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$31.50 to $32.00
No. 1 bundles	30.00 to 31.00
No. 2 bundles	28.50 to 29.00
No. 2 hvy. melting	30.00 to 31.00
Mach. shop turn.	19.75 to 20.25
Shoveling turn.	21.75 to 22.25
Cast iron borings	20.75 to 21.25
Mixed bor. & turn.	19.75 to 20.25
No. 1 cupola cast	35.00 to 40.00
Charging box cast	29.00 to 30.00
Stove plate	30.00 to 35.00
Clean auto cast	35.00 to 40.00
Malleable	33.00 to 33.50
Low. phos. plate	32.00 to 34.00
Scrap rails	29.75 to 30.25
Rails 3 ft. & under	33.75 to 34.25
RR. steel wheels	33.75 to 34.25
Cast iron carwheels	32.00 to 32.50
RR. coil & leaf spgs.	33.75 to 34.25
RR. knuckles & coup.	33.75 to 34.25
No. 1 busheling	30.00 to 31.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$31.50 to $32.00
No. 2 hvy. melting	31.50 to 32.00
Compressed sheet stl.	31.50 to 32.00
Drop forge flashings	31.50 to 32.00
No. 2 bundles	31.50 to 32.00
Mach. shop turn.	25.50 to 26.00
Short shovel	26.00 to 26.50
No. 1 busheling	31.50 to 32.00
Steel axle turn.	31.50 to 32.00
Cast iron borings	26.00 to 26.50
Mixed bor. & turn.	26.00 to 26.50
No. 1 machinery cast	37.50 to 40.00
Malleable	38.50 to 39.00
Railroad cast	40.00 to 45.00
Railroad grate bars	34.00 to 34.50
Stove plate	37.00 to 37.50
RR. hvy. melting	31.50 to 32.00
Rails 3 ft. & under	38.00 to 38.50
Rails 18 in. & under	40.00 to 40.50
Rails for rerolling	37.00 to 37.50
Elec. furnace punch	34.00 to 34.50

SAN FRANCISCO

Per gross ton delivered to consumer:
Cast grade f.o.b. shipping point

No. 1 hvy. melting	$19.50
No. 2 hvy. melting	19.50
No. 2 bales	19.50
No. 3 bales	16.00
Mach. shop turn.	13.00
Elec. furn. 1 ft. und.	19.50*
No. 1 cupola cast.	32.00
RR. hvy. melting	20.50

LOS ANGELES

Per gross ton delivered to consumer:
Cast grade f.o.b. shipping point

No. 1 hvy. melting	$19.50
No. 2 hvy. melting	19.50
No. 1 bales	19.50
No. 2 bales	19.50
No. 3 bales	16.00
Mach. shop turn.	13.00
No. 1 cupola cast	25.00
RR. hvy. melting	20.50

SEATTLE

Per gross ton delivered to consumer:
Cast grade f.o.b. shipping point

No. 1 & No. 2 hvy. melting	$19.00
Elec. furn. 1 ft. und.	19.00
No. 1 cupola cast	25.00*
RR. hvy. melting	20.00

HAMILTON, ONT.

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

Comparison of Prices . .

Advances over past week in **Heavy Type**, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Jan. 28, 1947	Jan. 21, 1947	Dec. 24, 1946	Jan. 29, 1946
Hot-rolled sheets	2.50	2.50	2.50	2.20
Cold-rolled sheets	3.20	3.20	3.20	3.05
Galvanized sheets (10 ga.)	3.55	3.55	3.55	3.70
Hot-rolled strip	2.50	2.50	2.50	2.10
Cold-rolled strip	3.20	3.20	3.20	2.80
Plates	2.65	2.65	2.50	2.25
Plates, wrought iron	5.95	5.95	4.112	3.80
Stain's c-r strip (No. 302)	30.30	30.30	30.30	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes.	$5.75	$5.75	$5.00	$5.00
Tinplate, electro (0.50 lb)	5.05	5.05	4.50	4.50
Special coated mfg. ternes	4.90	4.90	4.30	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.60	2.60	2.60	2.25
Cold-finished bars	3.20	3.20	3.10	2.75
Alloy bars	3.05	3.05	3.05	2.70
Structural shapes	2.50	2.50	2.35	2.10
Stainless bars (No. 302).	25.97	25.97	25.97	24.00
Wrought iron bars	6.15	6.15	4.76	4.40
Wire and Wire Products: (cents per pound)				
Bright wire	3.30	3.30	3.05	2.75
Wire nails	3.75	3.75	3.75	2.90
Rails: (dollars per 100 lb)				
Heavy rails	$2.50	$2.50	$2.50	$43.00*
Light rails	2.85	2.85	2.85	45.00*
*per gross ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$42.00	$42.00	$39.00	$36.00
Sheet bars	50.00	50.00	38.00	36.00
Slabs, rerolling	42.00	42.00	39.00	36.00
Forging billets	50.00	50.00	47.00	42.00
Alloy blooms, billets, slabs	61.00	61.00	61.00	54.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.55	2.55	2.55	2.15
Skelp	2.35	2.35	2.05	1.90

Pig Iron: (per gross ton)	Jan. 28, 1947	Jan. 21, 1947	Dec. 24, 1946	Jan. 29, 1946
No. 2, foundry, Phila.	$32.51	$32.43	$32.43	$27.59
No. 2, Valley furnace	30.50	30.50	30.50	25.75
No. 2, Southern, Cin'ti	31.75	31.75	29.80	26.19
No. 2, Birmingham	26.88	26.88	26.88	22.13
No. 2, foundry, Chicago†	30.50	30.50	30.50	25.75
Basic, del'd eastern Pa.	31.93	31.93	31.93	27.09
Basic, Valley furnace	30.00	30.00	30.00	25.25
Malleable, Chicago†	30.50	30.50	30.50	25.75
Malleable, Valley	30.50	30.50	30.50	25.75
Charcoal, Chicago	42.99	42.99	42.99	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$32.25	$32.25	$32.25	$20.00
Heavy melt'g steel, Phila.	31.00	31.00	31.00	18.75
Heavy melt'g steel, Ch'go	29.75	29.75	30.25	18.75
No. 1, hy. comp. sheet, Det.	27.00	27.00	28.50	17.32
Low phos. plate, Youngs'n	34.25	34.25	34.25	22.50
No. 1, cast, Pittsburgh	40.50	40.38	37.50	20.00
No. 1, cast, Philadelphia.	44.50	43.00	41.50	20.00
No. 1, cast, Chicago	44.25	44.25	44.00	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$8.75	$8.75	$8.75	$7.50
Foundry coke, prompt	8.50	8.50	8.50	9.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	19.50	19.50	19.50	12.00
Copper, Lake, Conn.	19.625	19.625	19.625	12.00
Tin, Straits, New York	70.00	70.00	70.00	52.00
Zinc, East St. Louis	10.50	10.50	10.50	8.25
Lead, St. Louis	12.80	12.80	12.35	6.35
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	37.67	37.67		35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	28.25	28.25	28.25	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Jan. 28, 1947	2.87255¢ per lb.	$30.15 per gross ton.	$31.00 per gross ton.
One week ago	2.87255¢ per lb.	$30.14 per gross ton.	$31.00 per gross ton.
One month ago	2.75655¢ per lb.	$30.14 per gross ton.	$31.00 per gross ton.
One year ago	2.54490¢ per lb.	$25.37 per gross ton.	$19.17 per gross ton.

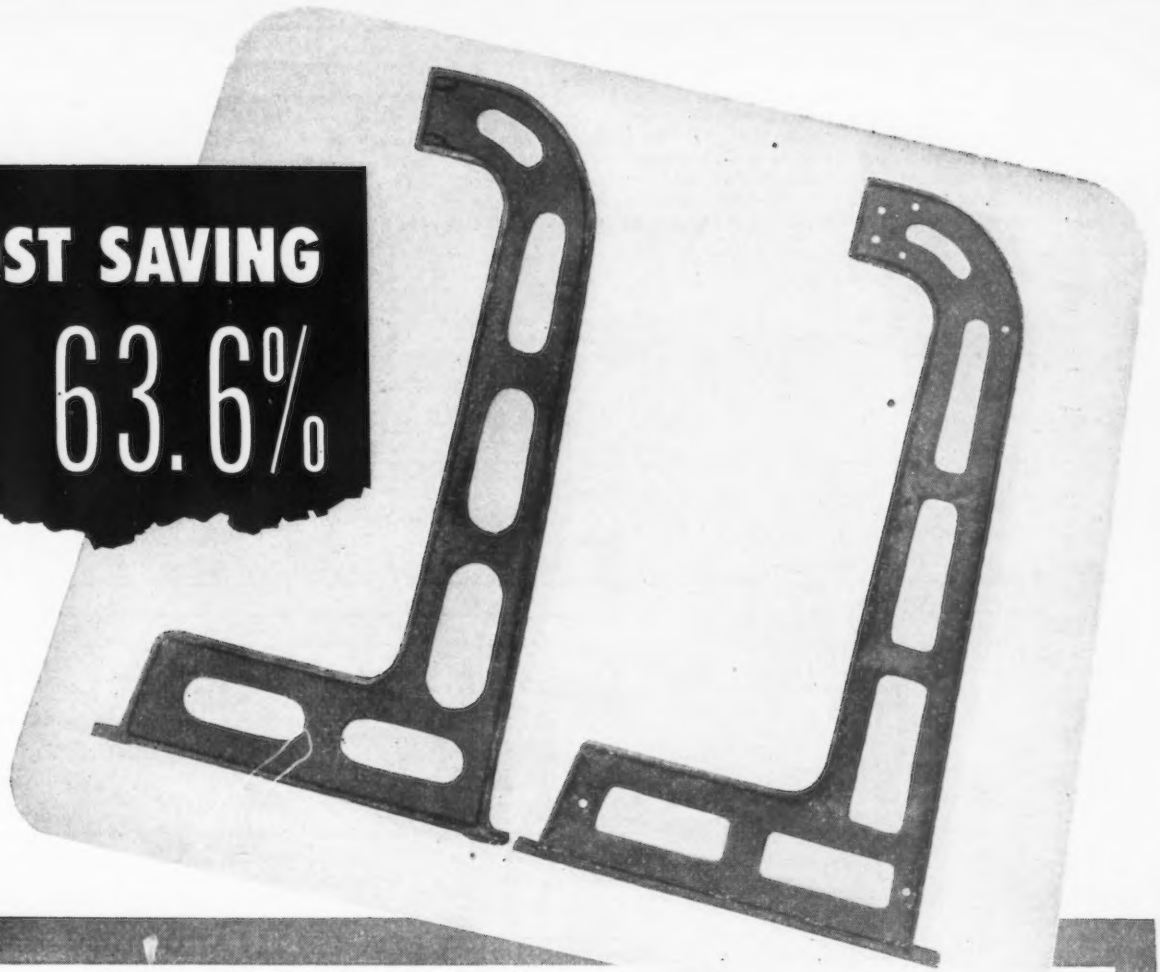
	HIGH	LOW	HIGH	LOW	HIGH	LOW
1947	2.87255¢	2.87255¢	$30.15 Jan. 28	$30.14 Jan. 7	$31.00	$31.00
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	$30.14 Dec. 10	$25.37 Jan. 1	$31.17 Dec. 24	$19.17 Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	25.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35267¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia, and Chicago.

COST SAVING 63.6%



Steel castings engineers are practical people. They know that neither the casting process nor any other process always has the answer when it comes to producing quality steel parts economically.

But there are many instances in industry where casting does afford big savings in production costs, often with greater strength and ability to perform.

The fabricated saw frame (right, above) was a perfectly satisfactory part. It did its job well.

Then the one-piece cast part (left, above) was designed. It did the job equally well, yet it cost 63.6% less to make.

Steel castings do not always show savings like that, but they do it often enough to make the subject worth investigating.

The first step in building an improved product, or in cutting costs, is to plan it that way—a steel castings engineer can help you. Steel Founders' Society, 920 Midland Building, Cleveland 15, O.

MODERNIZE AND IMPROVE YOUR PRODUCT WITH

STEEL CASTINGS

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 29,000 lb to 39,999 lb. (9) Carload lot in manufacturing trade. (10) This base price for annealed, bright finish wires, commercial spring wire. (11) Boxed. (12) Produced to dimensional tolerances in AISI Manual Sect. 6. (13) Billets only.

Basing Points	Pitts-burgh	Chicago	Gary	Cleve-land	Birm-ingham	Buffalo	Young-stown	Spar-rows Point	Granite City	Middle-town, Ohio			DELIVERED TO Detroit	New York	Phila-delphia
INGOTS															
Carbon, rerolling	($35.00 f. o. b. mill)														
Carbon, forging	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00								
Alloy	$52.00	$52.00				$52.00	(Bethlehem, Massillon, Canton, Coatesville=$52.00)								
BILLETS, BLOOMS, SLABS							(Provo=$53.20, Duluth=$44.00[13])								
Carbon, rerolling	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00					$44.50		
							(Provo=$61.20, Duluth=$52.00[13])								
Carbon, forging billets	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00						$52.50		
Alloy	$61.00	$61.00				$61.00	(Bethlehem, Massillon, Canton=$61.00)						$63.50		
SHEET BARS							$50								
PIPE SKELP	2.35¢	2.35¢					2.35¢	2.35¢	(Coatesville=2.35¢)						
WIRE RODS	2.55¢	2.55¢		2.55¢	2.55¢	(Worcester=2.65¢)									
SHEETS															
Hot-rolled	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.875¢	2.50¢			2.635¢	2.79¢	2.70¢
Cold-rolled [1]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢	3.20¢		3.30¢				3.335¢	3.61¢	3.58¢
Galvanized (10 gage)	3.55¢	3.55¢	3.55¢		3.55¢		3.55¢	3.55¢	3.65¢					3.84¢	3.75¢
Enameling (12 gage)	3.55¢	3.55¢	3.55¢	3.55¢			3.55¢		3.65¢				3.685¢	3.95¢	3.93¢
Long ternes [2] (10 gage)	3.55¢	3.55¢	3.55¢											3.95¢	3.91¢
STRIP															
Hot-rolled [3]	2.50¢	2.50¢	2.50¢		2.50¢		2.50¢						2.635¢	2.93¢	2.88¢
Cold-rolled [4]	3.20¢	3.30¢		3.20¢			3.20¢			(Worcester=3.75¢)			3.335¢	3.61¢	3.58¢
Cooperage stock	2.80¢	2.80¢			2.80¢		2.80¢							4.09¢	
TINPLATE															
Standard cokes, base box	$5.75	$5.75	$5.75		$5.85			$5.85	$5.85		(Warren, Ohio=$5.75)		$6.157	$6.062[11]	
Electro, box 0.25 lb	Deduct 90¢ from standard coke base box price.														
Electro, box 0.50 lb	Deduct 70¢ from standard coke base box price.														
Electro, box 0.75 lb	Deduct 50¢ from standard coke base box price.														
BLACKPLATE 29 gage [5]	3.60¢	3.60¢	3.60¢		3.70¢			3.70¢	3.70¢		(Warren, Ohio=$5.75)		3.94¢	3.99¢	3.90¢
TERNES, MFG. Special coated, base box	Deduct 85¢ from standard coke base box price.														
BARS															
Carbon steel	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	(Duluth=2.70¢) (Provo, Utah=3.30¢)					2.735¢	3.01¢	2.98¢
Rail steel [6]	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢									
Reinforcing (billet) [7]	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢					2.79¢	2.74¢	2.65¢
Reinforcing (rail) [7]	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢						2.735¢		
Cold-finished [8]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢	(Detroit=3.25¢, Toledo=3.385¢)							3.61¢	3.58¢
Alloy, hot-rolled	3.05¢	3.05¢				3.05¢	3.05¢	(Bethlehem, Massillon, Canton=3.05¢)					3.185¢		3.19¢
Alloy, cold-drawn	3.80¢	3.80¢	3.80¢	3.80¢		3.80¢							3.90¢		
PLATE								(Coatesville, Claymont=2.80¢, Geneva, Utah=2.80¢)							
Carbon steel [12]	2.65¢	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢	2.65¢					2.905¢	2.87¢	2.85¢
Floor plates	3.90¢	3.90¢											4.24¢	4.30¢	4.28¢
Alloy	3.79¢	3.79¢			(Coatesville=4.10¢)									4.01¢	3.895¢
SHAPES															
Structural	2.50¢	2.50¢	2.50¢		2.50¢	2.50¢	(Geneva, Utah=2.65¢) (Bethlehem=2.50¢)						2.81¢	2.70¢	2.64¢
SPRING STEEL, C-R															
0.26 to 0.50 carbon	3.55¢			3.55¢			(Worcester=3.75¢)								
0.51 to 0.75 carbon	4.80¢			4.80¢			(Worcester=5.00¢)								
0.76 to 1.00 carbon	6.65¢			6.65¢			(Worcester=6.85¢)								
1.01 to 1.25 carbon	8.85¢			8.85¢			(Worcester=9.05¢)								
WIRE [9]															
Bright [10]	3.30¢	3.30¢		3.30¢	3.30¢		(Worcester=3.40¢, Duluth=3.35¢)						3.56¢	3.71¢	3.68¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.25¢	4.25¢		4.25¢			(Worcester=4.40¢)			(Trenton=4.50¢)			4.51¢	4.66¢	4.345¢
PILING															
Steel sheet	3.00¢	3.00¢				3.00¢								3.41¢	3.38¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

BASING POINT	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	22.99	22.07	17.01	17.47	20.69	25.29
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	22.99	22.07	17.01	17.47	20.69	25.29
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt.	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Ft. Wayne, Titusville	22.99	22.07	17.01	17.47	20.69	25.29
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.05	25.97	20.02	20.56	24.34	29.75
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading Ft. Wayne, Watervliet	27.05	25.97	20.02	20.56	24.34	29.75
Plates, P'gh, Middletown, Canton	31.38	29.21	23.28	23.80	28.67	33.00
Shapes, structural, P'gh, Chi	27.05	25.97	20.02	20.56	24.34	29.75
Sheets, P'gh, Chi, Middletown, Canton, Balt	38.95	36.79	28.67	31.38	35.16	38.49
Strip h-r, P'gh, Chi, Reading, Canton, Youngstown	25.43	23.28	18.39	18.93	25.97	37.87
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.46	30.30	23.80	24.34	34.62	56.26
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila.	27.05	25.97	20.02	20.56	24.34	29.75
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton, (4 to 6 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, O.)*

An increase of 8.2 per cent applies to base price and extras

	Base per lb
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium*	42¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi 3¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	per lb
Field grade	4.20¢
Armature	4.50¢
Electrical	5.00¢
Motor	5.70¢
Dynamo	6.45¢
Transformer 72	6.95¢
Transformer 65	7.65¢
Transformer 58	8.35¢
Transformer 52	9.15¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., per 100 lb	$2.50
Angle splice bars, 100 lb	3.00
(F.o.b. basing points)	*per 100 lb*
Light rails (from billets)	$2.85
Light rails (from rail steel), f.o.b. Williamsport, Pa.	2.95

	Base per lb
Cut spikes	4.50¢
Screw spikes	6.40¢
Tie plate, steel	2.80¢
Tie plates, Pacific Coast	2.95¢
Track bolts	6.50¢
Track bolts, heat treated, to rail roads	6.75¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, add 25¢.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$6.75	$13.50

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	24.00*	22.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad		
10 pct, f.o.b. Coatesville	30.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	29.00	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per keg
Standard, galvanized and coated nails	$3.75†
Cut nails, carloads	5.05

†10¢ additional at Cleveland.

	Base per 100 lb
Annealed fence wire	$3.95
Annealed galv. fence wire	4.40

	Base column
Woven wire fence*	84
Fence posts, carloads	82
Single loop bale ties	86
Galvanized barbed wire**	94
Twisted barbless wire	94

*15½ gage and heavier. **On 80-rod spools in carload quantities.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	HI Steel	Mayari R	Otis-coloy	Yoloy	Y-50
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	American Rolling Mill
Plates	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	.....
Sheets									
Hot-rolled	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	.....
Cold-rolled	4.75	4.75	4.75	.....	4.75	4.75	4.75	4.75	5.225*
Galvanized	.....	5.40	.....	.....	.....	5.40	.....	.....	.....
Strip									
Hot-rolled	3.85	3.85	3.85	.....	3.85	3.85	3.85	3.85	.....
Cold-rolled	.....	.....	4.75	.....	.....	4.75	4.75	4.75	5.00*
Shapes	.....	3.85	.....	.....	3.85	3.85	3.85	3.85	.....
Beams	.....	3.85	.....	.....	.....	3.85	.....	.....	.....
Bars									
Hot-rolled	4.00	4.00	4.00	.....	.....	4.00	4.00	4.00	.....
Cold-rolled	.....	.....	.....	.....	.....	.....	.....	4.60	.....
Bar shapes	.....	4.00	.....	.....	4.00	4.00	4.00	4.00	.....

* 21 gage and lighter.

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe) Base price—$200.00 per net ton

Steel (buttweld, standard)

	Black	Galv.
½-in.	55½	41
¾-in.	58½	45
1-in. to 3-in.	60½	47½

Wrought Iron (buttweld, standard)

½-in.	2	+20
¾-in.	11½	+10
1-in. and 1¼-in.	17	+ 2
1½-in.	22½	1½
2-in.	23	2

Steel (lapweld, standard)

2-in.	53	39½
2½-in. and 3-in.	56	42½
3½-in. to 6-in.	58	44½

Wrought Iron (lapweld)

2-in.	14½	+ 5½
2½-in. to 3½-in.	17	+ 1½
4-in.	21	4
4½-in. to 8-in.	19	2½

Steel (butt, extra strong, plain ends)

½-in.	54½	41½
¾-in.	58½	45½
1-in. to 3-in.	60	48

Wrought Iron (same as above)

½-in.	6½	+14
¾-in.	12½	+ 8
1-in. to 2-in.	22	2

Steel (lap, extra strong, plain ends)

2-in.	52	39½
2½-in and 3-in.	56	43½
3½-in. to 6-in.	59½	47

Wrought Iron (same as above)

2-in.	17½	+ 2
2½-in. to 4-in.	26	8½
4½-in. to 6-in.	22	4

Basing discounts for standard pipe and reamed and drifted pipe are for threads and couplings. For threads only, one point higher discount (lower price) applies; for plain ends, buttweld, and lapweld 3 in. and smaller, three points higher discount (lower price) applies, while for lapweld 3½ in. to 6 in., four points higher discount (lower price) applies.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots

	Seamless Cold-Drawn	Hot-Rolled
2 in. O.D. 13 B.W.G.	$18.17	$15.29
2½ in. O.D. 12 B.W.G.	24.43	20.57
3 in. O.D. 12 B.W.G.	27.18	22.87
3½ in. O.D. 11 B.W.G.	34.30	28.86
4 in. O.D. 10 B.W.G.	42.55	35.82

(Extras for less carload quantities)

40,000 lb or ft and over	Base
30,000 lb or ft to 39,999 lb or ft	5 pct
20,000 lb or ft to 29,999 lb or ft	10 pct
10,000 lb or ft to 19,999 lb or ft	20 pct
5,000 lb or ft to 9,999 lb or ft	30 pct
2,000 lb or ft to 4,999 lb or ft	45 pct
Under 2,000 lb or ft	65 pct

CAST IRON WATER PIPE

	Per net ton
6-in. to 24-in., del'd Chicago	$74.33
6-in. to 24-in., del'd New York	73.60
6-in. to 24-in., Birmingham	65.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles or Seattle for all rail shipment; rail and water shipment less	88.40

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

	Percent Off List
½ in. & smaller x 6 in. & shorter	55
9/16 & ⅝ in. x 6 in. & shorter	52
¾ in. x 6 in. & shorter	49
1⅛ in. and larger, all lengths	48
Lag, all diam over 6 in. long	48
Lag, all diam x 6 in. & shorter	50
Plow bolts	57

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	48
9/16 to 1 in. inclusive	47
1⅛ to 1½ in. inclusive	45
1⅝ in. and larger	44

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less case lots		
7/16 in. and smaller	..	51
½ in. and smaller	48	..
½ in. through 1 in.	..	48
9/16 in. through 1 in.	47	..
1⅛ in. through 1½ in.	45	46
1⅝ in. and larger	44	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

	Consumer
Packages, nuts separate	60 and 10
In bulk	74

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets
(½ in. and larger)

	Base per 100 Lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$5.25
F.o.b. Lebanon, Pa.	5.40

Small Rivets
(7/16 in. and smaller)

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55 and 5

Cap and Set Screws *(In packages)*	*Percent Off List* Consumer
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	56
Set screws, cup and oval points	61
Milled studs	33
Flat head cap screws, listed sizes	21
Fillister head cap, listed sizes	40

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	$5.95
Old range, non-bessemer	5.80
Mesabi, bessemer	5.70
Mesabi, non-bessemer	5.55
High phosphorus	5.55

Prices quoted retroactive to Jan. 1, 1947.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	23¢ to 27¢
Copper, electrolytic, 100 and 375 mesh	28⅝¢ to 30⅝¢
Copper, reduced, 150 and 200 mesh	22⅜¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe	11¢ to 16¢
Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags	7.4¢ to 8¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	5¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	66¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	25¢ to 31¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	17¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to $1.75
Aluminum, 100, 200 mesh, carlots	25¢
Antimony, 100 mesh	39¢
Cadmium, 100 mesh	$2.00
Chromium, 100 mesh and finer	$1.25
Lead, 100, 200 & 300 mesh	17.55¢ to 21.05¢
Manganese, minus 325 mesh and coarser	44¢ to 61¢
Nickel, 150 mesh	51½¢
Silicon, minus 325 mesh and coarser	26¢ to 55¢
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.60
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb	$2.65
Under 100 lb	$2.90

COKE

Furnace, beehive (f.o.b. oven)	**Net Ton**
Connellsville, Pa.	$8.75
Connellsville, Pa., hand drawn	9.35
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	8.50
Foundry, Byproduct	
Chicago, del'd	15.10
Chicago, f.o.b.	14.35
New England, del'd	16.04
Kearny, N. J., f.o.b.	14.40
Philadelphia, del'd	14.62
Buffalo, del'd	14.75
Portsmouth, Ohio, f.o.b.	12.85
Painesville, Ohio, f.o.b.	13.50
Erie, del'd	14.50
Cleveland, del'd	14.55
Cincinnati, del'd	14.60
St. Louis, del'd	15.10†
Birmingham, del'd	12.25

†Except producers situated in states other than Missouri, Alabama or Tennessee, sellers may charge a maximum delivered price of $15.60 in the St. Louis Mo., and East St. Louis, Ill., switching districts.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads Per 1000
Sec. quality, Ohio	57.00
First quality, Pa., Md., Ky., Mo., Ill., Ohio	65.00
First quality, New Jersey	70.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	59.00
Sec. quality, New Jersey	62.00
Sec. quality, Ohio	57.00
Ground fire clay, net ton, bulk	9.50

Silica Brick

Pennsylvania and Birmingham	$65.00
Chicago District	74.00
Silica cement, net ton (Eastern)	11.50
Chicago	12.50

Chrome Brick	*Per Net Ton*
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks	$44.50
Domestic, f.o.b. Chewelah, Wash., in bulk	22.00
in sacks	26.00
Clinker (dead burned) dolomite, bulk, per net ton, f.o.b. York, Pa.	10.05

Midwest, add 10¢; Mo. Valley, add 20¢

WAREHOUSE PRICES

Delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		Plates 3/8 in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot-Rolled (10 gage)	Cold-Rolled (10 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled			Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615	Cold-Drawn, A 4140-50 Ann.
**Philadelphia	$4.24	$5.33	$5.29[a]	$4.43	....	$4.40	$4.22	$4.48	$5.38	$8.37	$8.37	$9.88	$9.88
New York	4.42	5.72[1]	5.47	4.62	5.25	4.34	4.17	4.62	5.42	8.42	8.42	9.92	9.92
Boston	....	6.218	....	....	5.156	....	....	....	5.468	....	....	....	....
Baltimore	4.09	....	5.14	....	....	4.39	4.34	4.45	5.35	....	....	....	....
Norfolk	....	....	....	....	....	....	....	....	....	....	....	....	....
Chicago	4.00	....	....	4.00	....	4.30	4.05	4.05	4.95	8.10	8.10	....	9.35
Milwaukee	4.199	5.349	5.249	4.199	....	4.499	4.249	4.249	5.149	8.399	8.399	9.649	9.649
Cleveland	....	....	....	....	....	....	....	....	4.95	8.358	8.358	9.35	9.35
Buffalo	4.00	5.15	5.35	4.302	6.002	4.65	4.05	4.05	4.95	8.10	8.10	9.35	9.35
Detroit	4.14	5.29	5.42	4.34	....	4.59	4.42	4.19	5.00	....	....	....	....
Cincinnati	4.116	4.716	5.166	....	....	4.803	....	....	5.252	....	....	....	....
St. Louis	4.199	5.349	5.424	4.199	....	4.499	4.249	4.249	5.324	8.574	8.574	9.824	9.824
Pittsburgh	3.725	4.60[1]	....	4.00	....	3.95	3.80	4.05	4.95	8.10	8.10	9.35	9.35
St. Paul	3.384[7]	5.534[1]	5.434[2]	4.404[7]	....	4.684[7]	4.434[7]	4.434[7]	5.726[6]	....	10.084[6]	....	11.726[6]
Duluth	....	....	....	....	....	....	....	....	....	....	....	....	....
Omaha	4.868	6.618[1]	5.918	4.862	....	5.168	4.918	4.918	5.818	....	....	....	....
Indianapolis	....	....	....	....	....	....	....	....	....	....	....	....	....
Birmingham	3.85	....	5.20	4.10	....	4.30	4.05	4.05	5.83	....	....	....	....
Memphis	....	....	....	....	....	....	....	....	....	....	....	....	....
New Orleans	....	....	....	....	....	....	....	....	....	....	....	....	....
Los Angeles	....	....	....	....	....	....	....	....	....	....	....	....	....
San Francisco	4.90[8]	6.30[9]	6.45	5.20[8]	....	5.00[8]	4.90[8]	4.70[8]	7.00[10]	....	....	....	....
Seattle	5.00	7.80	6.05	....	....	5.25	4.95	4.90	6.75	....	....	....	....
Portland	5.00[3]	....	6.25	....	....	5.40	5.10	5.10	....	....	....	....	....
Salt Lake City	5.85	....	7.10	....	....	5.55	5.85	5.95	7.00	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 and over.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 10,000 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999; (8) 400 lb and over; (9) 450 to 1499; (10) 500 to 999.

[a] Philadelphia: Galvanized sheet, 25 or more bundles.

* Add 29.1¢ for sizes not rolled in Birmingham.

** City of Philadelphia area only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area after deducting 34¢ per 100 lb (L.c.l. Sparrows Point to Philadelphia).

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums.

BASING POINT PRICES					
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	31.00	31.50	32.00	32.50	.....
Birdsboro	31.00	31.50	32.00	32.50	36.00
Birmingham	26.38	26.88	.....	.....	.....
Buffalo	30.00	30.50	31.00	31.50	.....
Chicago	30.00	30.50	30.50	31.00	.....
Cleveland	30.00	30.50	30.50	31.00	.....
Detroit	30.00	30.50	30.50	31.00	.....
Duluth	30.50	31.00	31.00	31.50	.....
Erie	30.00	30.50	31.00	31.50	.....
Everett	29.00	29.50	30.00	30.50	.....
Granite City	30.00	30.50	30.50	31.00	.....
Neville Island	30.00	30.50	30.50	31.00	.....
Provo	30.00	30.50	.....	.....	.....
Sharpsville	30.00	30.50	30.50	31.00	.....
Steelton	31.00	31.50	32.00	32.50	36.00
Swedeland	31.00	31.50	32.00	32.50	.....
Toledo	30.00	30.50	30.50	31.00	.....
Youngstown[1]	30.00	30.50	30.50	31.00	.....

DELIVERED PRICES† (BASE GRADES)						
Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	29.50	30.00	30.50	31.00	.....
Boston	Birdsboro-Steelton	4.82	.....	.....	.....	.....	40.82
Brooklyn	Bethlehem	3.00	34.00	34.50	35.00	35.50	.....
Brooklyn	Birdsboro	3.50	.....	.....	.....	.....	39.50
Canton	Clev., Ygstn., Sharpsville	1.67	31.67	32.17	32.17	32.67	.....
Cincinnati	Birmingham	4.87	31.25	31.75	.....	.....	.....
Jersey City	Bethlehem	1.84	32.84	33.34	33.84	34.34	.....
Jersey City	Birdsboro	2.33	.....	.....	.....	.....	38.33
Los Angeles	Provo	5.94	35.94	36.44	.....	.....	.....
Mansfield	Cleveland-Toledo	2.33	32.33	32.83	32.83	33.33	.....
Philadelphia	Swedeland	1.01	32.01	32.51	33.01	33.51	.....
Philadelphia	Birdsboro	1.49	.....	.....	.....	.....	37.49
San Francisco	Provo	5.94	35.94	36.44	.....	.....	.....
Seattle	Provo	5.94	35.94	36.44	.....	.....	.....
St. Louis	Granite City	0.75 Arb.	30.75	31.25	31.25	31.75	.....

(1) Struthers Iron & Steel Co., Struthers, Ohio, charges 50¢ per ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base price for low phosphorous $37.50 per gross ton, f.o.b. Lyles, Tenn. Delivered to Chicago, $42.99. High phosphorous charcoal pig iron is not being produced.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson Ohio—$36.00; f.o.b. Buffalo—$37.25. Add $1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	148.50
F.o.b. Pittsburgh	139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	6.40	6.65	7.20
Ton lots	7.30	7.90	9.80
Less ton lots	7.70	8.30	10.20

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$39.00	$40.00
F.o.b. Pittsburgh		44.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30
L.c.l. lots	32

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.10% max. C, 0.06% P, 90% Mn	21.00	21.40	21.65
0.10% max. C	20.50	20.90	21.15
0.15% max. C	20.00	20.40	20.65
0.30% max. C	19.50	19.90	20.15
0.50% max. C	19.00	19.40	19.65
0.75% max. C, 7.00% max. Si	16.00	16.40	16.65

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.45
Ton lots	7.40
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	6.15
Ton lots	7.05
Less ton lots	7.45

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $56.00 f.o.b. Keokuk, Iowa; $52.75 f.o.b. Jackson, Ohio; $54.00 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	14.65	16.90	18.65
97% Si, 1% Fe	15.05	17.30	19.05

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si. 1 lb briquets.

	Eastern	Central	Western
Carload, bulk	3.85	4.10	4.30
Ton lots	4.75	5.35	5.65
Less ton lots	5.15	5.75	6.05

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	11.65	...	...
50% Si	7.45	7.95	8.15
75% Si	9.25	9.55	10.30
80-90% Si	10.45	10.75	11.50
90-95% Si	12.05	12.35	13.05

Ferrochrome (65-72% Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00	23.40	24.00
0.10% C	22.50	22.90	23.50
0.15% C	22.00	22.40	23.00
0.20% C	21.50	21.90	22.50
0.50% C	21.00	21.40	22.00
1.00% C	20.50	20.90	21.50
2.00% C	19.50	19.90	20.50
65-69% Cr, 4-9% C	15.60	16.00	16.15
62-66% Cr, 4-6% C, 6-9% Si	16.60	17.00	17.15

Briquets—contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	9.85	10.10	10.20
Ton lots	10.75	11.65	12.25
Less ton lots	11.15	12.05	12.65

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	16.70	17.10	17.25
Ton lots	17.90	19.20	20.00
Less ton lots	18.60	19.90	20.70

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	20.00	20.40	21.00
Ton lots	21.00	21.65	22.85
Less ton lots	22.00	22.65	23.85

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed. 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	13.00	13.50	15.55
Ton lots	14.50	15.25	17.40
Less ton lots	15.50	16.25	18.40

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	16.50	17.35	19.10
Less ton lots	17.00	17.85	19.60

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone: 3.5¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	$1.60	$2.35	$2.95
Less ton lots	1.95	2.70	3.75

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

	Eastern	Central	Western
Ton lots	13.50	14.60	16.55
Less ton lots	14.25	15.35	17.30

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

Ton lots	13.25	14.35	16.30
Less ton lots	14.00	15.10	17.05

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe.

	Eastern	Central	Western
Ton lots	13.25	14.35	16.30
Less ton lots	14.00	15.10	17.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼X down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained T, 5 ton lots, freight allowed	$1.88
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos)	$2.90
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5	$1.10
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb.	
Ton lots	$2.50
Less ton lots	$2.55
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	95¢
Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo	80¢
Ferrotitanium, 40-45%, 0.10%C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.23
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10%C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton	$142.50
Ferrophosphorus, 18%, electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, Electrolytic, 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	14.50¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy	
Carload, bulk	4.85¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Niagara Falls, carload	6.25¢
Ton lots	6.75¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	8.50¢
Ton lots	9.25¢
Less ton lots	9.75¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed. Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$2.10	$2.1125	$2.1445

Silcaz, contract basis, f.o.b. plant freight allowed, per pound of alloy.

Carload lots	25¢
Ton lots	27¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.	
No. 1	57.5¢
No. 6	60¢
No. 79	45¢
Bortram, f.o.b. Niagara Falls	
Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Combined Tin Committee Sets Quota for First Half of 1947

Washington

• • • **The Combined Tin Committee** has recommended that interim allocations of tin metal for the first half of 1947 be set at approximately 50 pct of the allocations recommended for the last half of 1946. Final allocations for the first quarter will not be made until more information on future supplies can be obtained, the committee said.

Meanwhile, CPA in a report prepared for government distribution predicts an increase in domestic tin supplies, largely from greatly increased imports of pig tin. The agency has also announced domestic distribution for the first quarter (THE IRON AGE, Jan. 23, p. 120) which reflects this anticipated increase in supplies. Domestic stocks of pig tin and concentrate are declining according to the plan set up for withdrawals from these stocks.

During the current quarter, CPA expects supplies of 15,000 tons consisting of 7500 tons of concentrate and 7500 tons of metal. The concentrate will come largely from Bolivia, Netherlands, East Indies, and Siam. The metal supply is expected to come from the remaining Japanese stocks, Siam, China and secondary sources. The metal supply figure assumes that at least as much tin will be allocated to the United States by the Combined Tin Committee during the first half as in the corresponding period during 1946, and that 2000 tons from Siam which was allocated during the first half of 1946 will arrive during the first quarter of 1947.

CPA Predicts That a Gain In Imports Will Increase Domestic Supplies

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Fourth quarter 1946 supplies are estimated at 14,400 tons, consisting of 9000 tons of tin in concentrate, 4900 tons of metal, and 500 tons of secondary pig tin. Production of secondary pig tin during the first quarter is also estimated at 500 tons.

Stocks declined by 5153 tons during the third quarter, bringing the total concentrate and pig tin down to 65,600 tons. This is in line with the government's planned withdrawals but yet retaining sufficient reserves until world supply and demand are again in balance.

Lack of high grade concentrates forced the government smelters to curtail operations during the fourth quarter from a monthly rate of about 3800 tons to about 3000 tons. It is not expected that this latter rate will be exceeded during 1947 and as a result the lower rate will be reflected in declining stocks of pig tin. This is in contrast to 1946 when pig tin stocks remained stable and all of the decline occurred in stocks of concentrates. Now that concentrate stocks are approaching a working level the quarterly deficit will have to be absorbed by the government stock of pig tin.

Less Nickel to France

Paris

• • • **Nickel production** in New Caledonia is being held up by the lack of coal and a serious manpower shortage caused by the departure of Indo-Chinese and Javanese workers at the end of the war.

After war shipping became unavailable for the shipment of coal from Australia, the Doniambo smelter closed down in July, but it is likely that the electric furnaces of Yate will be put in operation this month. Production of the Noumea smelter is reserved for the French refinery at Le Havre, and this plant expects to receive about 1800 to 2000 tons of matte during 1947. Production of nickel in the Le Havre works during November was 133 tons.

Interim Tin Allocation—First Half 1947
(Gross Tons)

U. S. A.	3,640
France	2,275
India	1,140
Canada	680
Italy	455
Sweden	390
Switzerland	365
Czechoslovakia	340
Poland	205
New Zealand	150
Hong Kong	150
Denmark	140
Austria	115
Brazil	115
Argentina	100
Turkey	100
Egypt	100
Other Middle East (including Palestine)	100
Yugoslavia	90
Other Latin America	80
Finland	70
Norway	70
Greece	45
Total	10,915

U. S. Tin Position During the Third Quarter, 1946, Estimated Position During the Fourth Quarter, and Proposed Distribution During the First Quarter, 1947
(Gross Tons of Tin Content)

	1946 Third Quarter Actual	1946 Fourth Quarter Estimated	1947 First Quarter Proposed
NEW SUPPLY:			
Imports of Concentrate	9,411	9,000	7,500
Imports of Pig Tin	2,286	4,900	7,000
Secondary Pig Tin	654	500	500
	12,351	14,400	15,000
REQUIREMENTS:			
Domestic Consumption	16,205	16,580	18,400
Exports	148	100	100
	16,353	16,680	18,500
SURPLUS or DEFICIT: (Including smelting loss)	−5,153	−2,930	−4,000
STOCK: (End of Period)			
Concentrate—Government	27,278	23,328	21,328
Private	368	350	350
Pig Tin—Government	23,214	23,992	21,992
Private	14,740	15,000	15,000
Total	65,600	62,670	58,670

Mines Bureau to Use War Developments In Minerals Production

Washington

• • • **With inroads** made by war upon reserves leaving the United States wholly dependent upon foreign sources for a half-dozen minerals and metals and partially dependent for others, during its first full postwar year the Bureau of Mines has concentrated upon adapting war-developed processes to civilian production and intensified technical research into new and more efficient production processes, synthetics and machinery.

In his annual report, R. R. Sayre, Bureau director, revealed that although examination and test-pitting of deposits had been greatly retarded last year, new reserves have been marked out in iron ores, fluorspar, mica, corundum, beryl, bauxite, and tungsten, nickel and manganese ores.

A potential reserve of magnetite was located in Utah, he added, where a deposit estimated at about 375,000,000 tons is expected to be a principal raw material source for the Pacific Coast steel industries. In addition, several successful peacetime operations were established for mining mercury, copper, lead, zinc, asbestos and feldspar.

Mr. Sayre also revealed that the Bureau's metallurgical research last year produced four new highly pure metals—electrolytic chromium, electrolytic cobalt, ductile titanium and ductile zirconium. These, added to prewar development of electrolytic manganese and sponge iron, are regarded as important aids to research problems requiring metals for high temperature service.

Production figures for helium, kept carefully under wraps during the war, were revealed as totaling more than 434 million cu ft over the past six years; more than half of last year's production (63.4 million cu ft) was returned to the Texas underground reservoir and the Otis, Kans. helium plant was marked for standby status.

Because of continued shortages of coal, the Bureau has intensified its search for new domestic sources of coking coal and continued its technical research into more efficient mining, use and conservation of this fuel. Likewise, it has been striving to improve

war-developed processes for breaking down low grade ores.

A newer field into which the Bureau delved during the past year is the development of aviation fuels. It has now been determined that at least 30 of this nation's common crudes are suitable for production of jet propulsion fuels.

Atomic Energy Talks Will Highlight AIME Session in New York

New York

• • • **An outstanding feature** of the program planned for the World Conference on Mineral Resources in connection with the official observance of the 75th Anniversary of the American Institute of Mining and Metallurgical Engineers at the Waldorf-Astoria Hotel, March 17, 18, and 19th, 1947, will be a session on "The Mineral Industry and Atomic Energy," according to an announcement by Louis S. Cates, President of the institute.

"The 3-day conference," said Mr. Cates, "will cover virtually every phase of the world's situation at this time with respect to iron and steel, coal, petroleum, nonferrous metals, and most important of all, atomic energy."

Mr. Cates stated that delegates from every mineral producing country in the world are being invited to the Conference, with the State Dept. cooperating in helping to compile the invitation list and in advising foreign engineers and metallurgists, through its representatives abroad, of the scope and importance of the meeting.

"We are confident," Mr. Cates said, "that this World Conference on Mineral Resources will take its place among the most important meetings of its kind ever held. It will, among other things, consider the heavy demands made upon these resources by two world wars. It will take cognizance of the increased responsibilities imposed upon mineral technology to replenish our depleted mineral resources.

"The discussions, conclusions, and interchange of up-to-date information which the conference makes possible will be of utmost interest not only to professional men but to citizens of all the world concerned with a peaceful, progressive, prosperous, and comfortable future."

Plastic Coated Pipe Resists Corrosion

Pittsburgh

• • • **Development of plastic coated steel drill pipe resistant to the corrosive conditions often encountered in oil well drilling has just been announced by the Spang-Chalfant division of the National Supply Co., Pittsburgh. Unique properties of plastic coated pipe promise to open broad fields for its use in many other industries, including home and industrial construction.**

During field tests of the new drill pipe several oil wells were drilled to more than 60,000 ft of depth. These tests indicate that plastic coating will prevent many failures of pipe during drilling by protection of the surface against corrosion pitting.

Only the inside of the pipe is coated for oil well drilling because it has been found that almost all corrosion fatigue failures develop from the inside. This is because the pipe turning in the hole keeps its outside surface burnished by rubbing against the wall of the hole. For most other applications the pipe probably would need to be coated on both the inside and outside surfaces.

Schwanhausser to Head Diesel Engine Group

Chicago

• • • **E. J. Schwanhausser,** vice-president of Worthington Pump & Machinery Corp., was re-elected president of the Diesel Engine Manufacturers Assn. recently.

Also returned to their posts as vice-presidents of the association were J. E. Peterson, vice president of General Machinery Corp., and Gordon Lefebvre, president of Cooper-Bessemer Corp. Robert H. Morse, Jr., vice-president and general sales manager of Fairbanks, Morse & Co., was again chosen to serve as treasurer.

Directors were elected as follows: William E. Corrigan, vice-president of American Locomotive Co.; George W. Codrington, vice-president of General Motors Corp. and general manager, Cleveland Diesel Engine Div.; A. W. McKinney, vice-president and general manager of sales, National Supply Co.; Robert E. Friend, president, Nordberg Mfg.

Information Free

(1) Precision Benders:

How Di-Acro benders eliminate dies in contour forming of ductile materials such as tubing, angle, channel and flat, round or square materials is shown in folder. Die-less duplicating possibilities of the bender are outlined. *O'Neil-Irwin Mfg. Co.*

(2) Clamshell Buckets:

Catalog describes and illustrates advantages of clamshell buckets and grapples, explaining features of performance and construction of each type. Recommendations to aid in selecting the proper bucket for any kind of service are made. *Owen Bucket Co.*

(3) Profilers:

Specially built profilers available for manual or automatic, air or hydraulic operation, single or double spindle, and having chute feed are described in pamphlet. Models are designed in three sizes, for machining operations such as burring, boring, centering, facing, chamfering, reaming, etc. Sectional views and specifications are given. *Pines Engineering Co., Inc.*

(4) Plastic Coatings:

Use and advantages of plastic seal for protective packaging against rust, corrosion and physical damage are outlined in pamphlet, which also explains how to apply and remove the coating and describes equipment needed. *Progressive Systems, Inc.*

(5) Horizontal Plate Filters:

Principle of filtration with horizontal plate filters for handling any liquid from heavy varnishes to light alcohols is discussed in folder. Details of design and construction and specifications data are given. *Sparkler Mfg. Co.*

(6) Dust Collectors:

Catalog No. 33 describes cloth filter type dust collectors and cyclone type dust separators. Units are self-contained, designed for carrying away dust-laden air around grinding, cutting and polishing wheels. Models and typical installations are illustrated. *Torit Mfg. Co.*

(7) Inclinable Presses:

Open back inclinable presses of 10 and 19-ton capacity and a 9-ton flywheel press, all featuring clutch mechanism for positive single or continuous strokes, are described and illustrated in folder. Models have 6-in. die space, 1¼-in. standard stroke and are rated at 200-210 strokes per min. *Fast Feed Machine Corp.*

(8) Bushings and Bearings:

Illustrated catalog gives detailed descriptions of a range of bronze, brass and steel "seam-type" bushings, bearings and spacer tubes. Tabular matter includes applications of popular bushing and bearing alloys, material specifications, tolerances, groove patterns and ordering information. *National Formetal Co., Inc.*

(9) Mold Bases:

Line drawings, dimensions and instructions for ordering jigs, fixtures, dies, special machines and precision parts are contained in catalog, together with graphic illustrations of plant facilities and equipment for manufacturing these products. *Master Machine & Tool Co.*

(10) Horizontal Milling Unit:

How a horizontal milling unit designed to eliminate resetting of any model Bridgeport vertical mill, becomes a permanent, integral part of the mill is shown in folder. Setup and design features are described. Spindle speed is from 125 to 2000 rpm. *Malnar Machine & Tool Co., Inc.*

(11) Shot Peening:

Detailed explanation of the shot peening process for strengthening metals by improving the fatigue strength of the metals is given with illustrations in 128-p. book. Applications and advantages of shot peening, with the equipment and procedures involved, are discussed in part 1. Part 2 covers the theory of prestressed surfaces in relation to shot peening. *American Wheelabrator & Equipment Corp.*

(12) Hydraulic Floor Cranes:

Ease of handling heavy, bulky, awkward loads with hydraulic floor cranes of 1, 2 and 3-tons capacity is discussed and actual applications are illustrated in folder. *Ruger Equipment Co.*

(13) Crucible Furnaces:

Information on various types of gas-fired crucible furnaces described in Catalog C-2 include such factors as heat input, type of refractory, structural framework, atmosphere and temperature control. Tables give technical data. *Eclipse Fuel Engineering Co.*

(14) Parts Cleaning System:

Operating and construction features of the Agitor parts cleaning system which uses cold solvents and has action controlled for hose cleaning, agitation or fountain-surge basket cleaning are highlighted in folder. Equipment is illustrated. *Gray-Mills Corp.*

(15) Pyrometers:

Bulletin 2282 contains information on a line of single and multipoint types of pyrometers for temperature measuring in all types of service. Electrical resistance thermometers for low temperature reading and direct reading air velocity meters are also described. *Illinois Testing Laboratories, Inc.*

(16) Diecasting Machines:

Machines for diecasting and injection molding of nonferrous metals, featuring one-piece cast steel frames and double toggle die locking mechanism are described in leaflet. Die locking pressures are 600, 300, 150 and 70 tons, with varying metal capacities per shot. *Lester Phoenix, Inc.*

(17) Punches and Retainers:

Catalog C-4 presents complete line of standardized piercing punches, featuring the Hovis Screwlock principle in which the piercing shock is taken directly on the backing plate and the stripping strain is taken by the lock screw. Button dies and retainers are also listed with specifications and line drawings. *Hovis Screwlock Co.*

(18) Gas Combustion Units:

Shown in folder ID-163 is a line of improved gas combustion equipment, including mixers, blast pilot assembly, blowers and burners, designed through "Combustioneering" to give better results in gas combustion for industry. *Bryant Heater Co.*

(19) Tenite Injection Molding:

Aspects of the injection molding process for forming the thermoplastic, Tenite, are covered in 35-p. book. Choice of material; preparation; proper design of the product; injection molding machines; mold design and construction and methods of finishing are discussed. *Tennessee Eastman Corp.*

(20) Contour Saws:

Contour saws which are packed in strip-out metal containers and can be butt welded into perfect bands are listed in folder, giving pitch and velocity specifications of saws for various jobs. *DoAll Co.*

(21) Vapor Degreasers:

Process of solvent vapor degreasing for the cleaning of metal and alloy parts, in only a few seconds, without need of subsequent rinsing or drying operations is described in book together with design and construction features of various types of conveyorized and batch type automatic degreasers. *G. S. Blakeslee & Co.*

NOTICE TO READERS: Offer limited to two months from date of issue.

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(22) Stainless Tubes:

Book contains information and counsel about properties, manufacture and uses of stainless steel, nickel, Monel and Iconel tubing. Applications of Trentweld, the company's process of tube making, are illustrated and specifications are given. *Trent Tube Mfg. Co.*

(23) Gear Speed Reducers:

Line of gears and gear reducers, racks and flexible couplings are illustrated in bulletin, giving specifications of the various continuous-tooth herringbone, planetary gear, spiral bevel and worm gear speed reducers and motorized speed reducers. *D. O. James Mfg. Co.*

(24) Liquid Envelope:

Story of "Liquid Envelope," a peelable plastic protective coating, used in the protection of ordnance and hull equipment against corrosion and deterioration, is told in 32-p. book. Uses and types of films with instructions for application and typical examples are presented. *Better Finishes & Coatings, Inc.*

(25) Automatic Wrenches:

Illustrated leaflet explains how to banish "wrench wrestling," through use of an automatic wrench, consisting of a motor driven wrench designed to fit the sockets of the particular chuck being used. Convenient handle provides control in tightening or loosening jaws, regulating the tension of the work. *Ben Machine Co.*

(26) Exhaust Fans:

Bulletin on Durco corrosion-resistant fans for exhausting acid and other corrosive fumes gives engineering data including dimensions and capacities of five standard sizes of fans. Alloys used in fan fabrication are discussed and drawings show typical applications. *Durtron Co., Inc.*

(27) Precision Castings:

Basic advantages of precision casting of parts over forging and machining practices are outlined in bulletin. Engineering service and assistance available for understanding various customer problems and requirements irrespective of steel or high melting point alloy required are presented. *Bergen Precision Castings, Inc.*

(28) Silent Check Valve:

Williams-Hager flanged silent check valve for control of hot or cold fluids in power plant operations is described in pamphlet. Valves of iron, steel or bronze with renewable seats and disks of bronze, are built in sizes from 1 to 20 in., for all pressures up to 6000 lb and for any temperature. *Williams Gauge Co.*

(29) Laboratory Equipment:

Design features, performance and uses of laboratory equipment for precise and rapid analysis in the metallurgical field are presented in pamphlet, with illustrations of the 3000°, 2500°, 2400°, 2200° F combustion furnaces, carbon determinators, combustion boats and covers, burets and circulating pumps. *Laboratory Equipment Corp.*

(30) AC Arc Welding:

Construction features and performance of general service ac arc welders for use on light gage materials as well as on heavier jobs are outlined in circulars NH 106 and 107. Versatility of ac welding is graphically illustrated, stressing ease of starting the arc even under adverse conditions. *Hollup Corp.*

(31) Industrial Motors:

Revised catalog and price book contains complete information on line of Delco motors. Section A is devoted to general information such as prices, definitions, classifications, applications, etc., with Section B giving pertinent information and statistics on the various types of polyphase and squirrel cage induction motors. *Delco Products Div., General Motors Corp.*

(32) Gas-Fired Heat Treaters:

Design and specifications of unit type standard gas fired heat treaters are given in equipment bulletin No. 120-B. Heaters are under fired only or over and under fired, giving close accurate control and uniformity at 1000° to 1800° F. *Mahr Mfg. Co.*

(33) Steel Floor Plate:

Booklet furnishes engineers and purchasing agents with complete data pertaining to four rolled steel floor plate patterns which are designed to protect against slipping from any angle, under all conditions. Blue prints and illustrations show actual size of diamond and ribbed patterns; tables give weights and sizes. *Alan Wood Steel Co.*

(34) Trucks and Cranes:

Thirty-one models of industrial trucks and cranes are shown in illustrated catalog with principal specifications given. Low-lift, with and without crane units; high-lift platform trucks having capacities up to 50,000 lb; fork-type trucks; cranes; stationary bed load carriers and tractors, all available with electric or gas-electric power are the types included. *Elwell-Parker Electric Co.*

(35) Rivets:

Forty-eight page catalog on rivets contains a complete set of weight tables for both large and small diameter rivets together with head dimensions for all standard rivets. Small rivets range from ¼ to 7/16-in. diam with lengths up to 3 in.; range of large rivets is ⅛ to 2-in. diam. *Champion Rivet Co.*

(36) Automatic Diecasting:

Features of automatic high speed zinc, lead and tin diecasting machine are described in folder. Sequence pictures show how its cycling mechanism provides automatic die movement, shot injection and casting ejection in continuously repetitive cycles. Shot capacity of machine is listed at 16 oz, with a casting area of 30 sq in. *Light Metal Machinery, Inc.*

(37) Babbitt Bearings:

"How to Pour Bearings" is the title of an illustrated wall card featuring a series of six cartoon type pictures showing the steps necessary to secure good, tightly lined bearings. Instructions are clear and easy to follow. *Joseph T. Ryerson & Son, Inc.*

(38) Pump Valve Service:

Illustrated catalog No. 920 summarizes design characteristics of Durabla valves and indicates their adaptability for use as replacement units on any type of reciprocating pump. Special features of the valve units are also described. *Durabla Mfg. Co.*

(39) Arcwelding:

Illustrated folder covers the development, advantages, applications and data on flux-coated rods for arcwelding at lower base metal temperatures than are ordinarily required. Typical applications of these "LowTemp EutecTrodes" are pictured. *Eutectic Welding Alloys Corp.*

(40) Flexible Couplings:

Revised bulletin (No. 447), with many photographs, drawings and installation illustrations, describes Farrel Gearflex couplings and gives recommendations for specific applications. Included also are engineering data with ratings, dimensions and weights. *Farrel-Birmingham Co., Inc.*

(41) Fire-Fog Equipment:

Effective use of Fire-Fog portable spray nozzles in extinguishing fires in oils or other flammable liquids, by blanketing, isolating and quenching is stressed in bulletin No. 60. Photographs demonstrate density of discharge at water pressures of both 30 and 100 lb psi. *Automatic Sprinkler Corp. of America.*

(42) Porous Castings Sealant:

Use of Laminac resin as a sealant for porous metal castings is discussed in bulletin, indicating advantages as a sealant as well as a preventive against steam corrosion. Methods of impregnating castings are described in detail and illustrated by schematic drawings. *American Cyanamid Co.*

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Co.; Norris H. Schwenk, president of Busch-Sulzer Bros.-Diesel Engine Co.; and G. F. Twist, vice-president and general manager, Atlas Imperial Diesel Engine Co.

Harvey T. Hill, who for 3 yr has been executive director of Diesel Engine Manufacturers Assn., was appointed to continue in that capacity.

Canadian Output Of Pig Iron in November Reached 135,269 Tons

Toronto

• • • **Canadian pig iron** production returned to a more normal rate in November and was only 4.7 pct below the average for the first 6 months of the year, following the conclusion of the steel strike which brought output in this country for the 4 months immediately preceding to the lowest level in almost 10 years.

Pig iron output for November amounted to 135,269 net tons or 58.5 pct of rated capacity and compares with 74,958 tons or 32.4 pct in October and 134,651 tons or 58.3 pct in November 1945, while the monthly average for the first 6 months of 1946 was 63.2 pct.

November's output included 105,643 tons of basic iron, of which 2427 tons were for sale and the balance for further use of producers; 16,659 tons of foundry iron, all for sale, and 12,967 tons of malleable iron, all for sale.

During November 11 furnaces were in blast and 5 blown out of the total of 14 furnaces in Canada. Blast furnace charges in the month included 234,412 tons of iron ore; 23,672 tons of mill cinder, scale, sinter, etc., and 6762 tons of scrap iron and steel.

Following are comparative monthly production figures in net tons for 1946:

	Pig Iron	Ferro-alloys
January	143,683	10,878
February	143,171	10,872
March	157,936	8,405
April	142,240	13,083
May	159,101	14,069
June	129,890	11,684
July	64,472	6,243
August	46,494	6,013
September	45,078	6,164
October	74,958	8,448
November	135,269	9,370
Total, 11 months	1,242,294	105,229

London Economist

(CONTINUED FROM PAGE 111)

tee. Its students are recruited exclusively from members of the party, not older than 40 years of age, graduates of other universities who are to undergo a special 3 years' training in Marxian theory.

This revivalism is not a spontaneous growth originating among fervent believers—it is state-sponsored. The state mobilizes its resources in order to educate new "Marxian-Leninist cadres," in order to recreate a new Bolshevik generation in Russia.

Another aspect of the purge, one that is of more immediate practical importance, is the fight against war-weariness, cynicism and corruption. The postwar malaise is intense, widespread and amorphous. It reflects the magnitude of the devastation and impoverishment of the Soviets through the war; and the consequent hardships of everyday life. The war-weariness and the cynicism are politically mute, but they are ubiquitous. They have found some muffled expression in the writings of the group of Leningrad writers mentioned, who are, incidentally, mostly writers of the older generation, essentially nonpolitical and ideologically indifferent. That a few short stories or verses should have roused the ire of the Politbureau may seem very strange indeed.

But the story writers and the poets seem to have served merely as a pretext—the real target has almost certainly been the much wider mood of tiredness and apathy which they tended to express and which looms in the background. In no other country, of course, would a Cabinet Minister take upon himself a role that may properly belong to the literary critic. But then the attitude of the Russian public towards its men of letters has always — even in prerevolutionary days—been very different from that of a Western European public.

The Russian youth does take practical guidance as well as inspiration from fiction writings. The moods of novelists and poets have a very direct effect on its own behavior. Russian readers of Tolstoy, for instance, once used to follow in their master's footsteps, to leave their homes and families and to

(CONTINUED ON PAGE 150)

(*Continued from page* 66)

Metal Lead Primer: Metallic, lead-type priming paint used as alternative to aluminum priming paint, especially for ship building, aircraft work and shore construction. Made by Midland Paint & Varnish Co., 9202 Reno Ave., Cleveland 5.

Metal Polish H&VW: Metal polish. Hanson-Van Winkle-Munning Co., Matawan, N. J.

Metal Sorter: Light-weight electronic instrument for sorting and identifying ferrous and nonferrous metals and alloys; specimen rubbed against known sample. Control Equipment Co., 547 Brushton Ave., Pittsburgh 21.

Metalastic: Metal protective paint for structural steel, exterior and interior; full color range. Sherwin-Williams Co., 101 Prospect Ave., N. W., Cleveland 1.

Metaline: Liquid metal compound; can be applied as a heavy coating over small pin holes in metal patterns or around edges for thin fillets; also as a bond between two surfaces. Tamms Silica Co., 230 La Salle St., Chicago 3.

Metaline: Self-lubricating material for insertion into bronze bushings. R. W. Rhoades Metaline Co., Inc., P. O. Box No. 1, Long Island City, N. Y.

Metalite: Aluminum-oxide abrasive. Clover Mfg. Co., Norwalk, Conn.

Metalite: Thin face sheets of aluminum bonded to balsa wood core. For radios, refrigerators, housing, etc. Chance Vought Aircraft Div., United Aircraft Corp., Stratford, Conn.

Metalites: Metalescent finishes, air dry and bake. Zapon Div., Atlas Powder Co., Stamford, Conn.

Metaljoiner: Solder for general use. Colonial Alloys Co., Ridge Ave. & Crawford St., Philadelphia.

Metalkase: Metal-encased refractory brick for basic-electric steel melting furnaces. Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh 22.

Metallized: Corrugated metal gasket inlaid with asbestos cord and coated with heat and corrosion-resistant coating. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.

Metallizing: Metal spraying technique and equipment. Metallizing Engineering Co., Inc., 33-16 30th St., Long Island City, N. Y.

Metalprep: Wipe-off and wash-off grades for preparing ferrous metal surfaces for painting; rust removing and metal cleaning. Neilson Chemical Co., 6564 Benson St., Detroit 7.

Metaltite. Refractory mortars. Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis 1.

Metalwash: Automatic cleaning machinery for removing tripoli, rouge, etc. Metalwash Machinery Co., 150 Shaw Ave., Irvington 11, N. J.

Metaseal 494: Protective, invisible, transparent coating; useful as a rust-preventive for steel, brass, and other materials; applied by dipping, spraying or brushing. Surface Finishing Products Co., New Haven, Conn.

Metastrip: Non-caustic stripping compound, used in stripping baked enamels, varnishes, lacquers, paints, japans, and new synthetic finishes from various metals. Surface Finishing Products Co., New Haven, Conn.

Metavac: Vacuum-deposited metallic coatings on plastics, glass, etc. Metavac, Inc., 131-35 Avery Ave., Flushing, L. I., N. Y.

Metco: Machines and various metallic wires for spraying molten metals for appearance, wear and corrosion resistance, and building up worn machine parts. Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City 1, N. Y.

Metcolite: Nonmetallic abrasive for blasting surfaces prior to metal spraying. Metallizing Engineering Co., Inc., 38 30th St., Long Island City 1, N. Y.

Metcolized: Process for protecting ferrous and nonferrous metals against oxidation and scaling at high temperatures. Metallizing Engineering Co., Inc., 38 30th St., Long Island City 1, N. Y.

Metcolizing: Metal spraying technique for inhibiting scale formation on outside surface of magnesium melting pots. Metallizing Engineering Co., Inc., 33-16 30th St., Long Island City, New York.

Metcoloy: Three special alloy wires for metal spraying. Metallizing Engineering Co., Inc., 38 30th St., Long Island City 1, N. Y.

Metcoseal: Sealing agent used on surfaces which have been Metcolized. Metallizing Engineering Co., Inc., 38 30th St., Long Island City 1, N. Y.

Meterol: Metering-type fuel-oil valve for precision control of flow. Automatic Temperature Control Co., Inc., 34 E. Logan St., Philadelphia 44.

Metex: Acid additive, wetting agent for Iridite, Cronak and other solutions. MacDermid, Inc., Waterbury 88, Conn.

Metlite: Synthetic bronze with 4 graphite, 7.5 Pb for brush and current collectors on electric machines. General Electric Co., Schenectady, N. Y.

Metlbond: Plastic adhesive for joining metals to either metals or nonmetals. Liquid, paste or tape forms. Requires 330° F. temperature and pressure. Consolidated Vultee Aircraft Corp., San Diego, Calif.

Metl-Hub: Rotary industrial brushes. Hanson-Van Winkle-Munning Co., Matawan, N. J.

Metroflux: Magnetic crack detector for ferromagnetic materials. Metropolitan-Vickers Electrical Co., Ltd., Trappord Park, Manchester 17, England.

Metrovac: High vacuum pumping machine, 0.025 mm Hg, for purification of metals, other industrial processes. Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester 17, England.

Metrox: Red lead for paint, ceramic, varnish, glass, and battery manufacturers; litharge for manufacturing batteries, glass, ceramics, insecticides, varnish, rubber, paints, chemicals, metallic dryers, brake linings, dry colors, and refining of petroleum. Metals Refining Co., Div. of Glidden Co., Hammond, Ind.

Metso Anhydrous: An alkali (anhydrous sodium silicate), cleaning compound used as a base for alkaline-type cleaners for metals and metal parts. Philadelphia Quartz Co., 125 S. 3rd St., Philadelphia 6.

Mexacote: Foundry mold wash. U. S. Graphite Co., Saginaw, Mich.

Mexican Graphite: Ingot mold wash, pipe eliminator, lade recarburizer, etc. United States Graphite Co., Saginaw, Mich.

Mexicast: Firebrick. Mexico Refractories Co., Mexico, Mo.

Mex-R Co: Firebrick. Mexico Refractories Co., Mexico, Mo.

MI Type: Medium size knee and column type milling machine for general purpose work. Cincinnati Milling Machine Co., Marburg Ave., Cincinnati.

Mica Schist: Natural rock refractory, used for bessemer converters and cupolas. Edge Hill Silica Rock Co., Fort Washington, Montgomery Co., Pa.

Micarta: Resinoids. Westinghouse Electric Corp., E. Pittsburgh.

Micreoil: Light transparent fast-drying (30 to 45 min) oil with a high flash point, applied by hand dipping, used as protective film on any metal surface for protection against rusting or oxidation. Michigan Chrome & Chemical Co., E. Jefferson St., Detroit.

Michiana: Corrosion and heat resisting Cr-Ni Iron alloys for castings to resist sulphur-bearing gases at elevated temperatures, grids, furnace parts. Michiana Products Corp., Michigan City, Ind.

Michigan: Cold-drawn seamless steel aircraft, mechanical and pressure tubing. Michigan Seamless Tube Co., South Lyon, Mich.

Michigan Metal: Low-metalloid steel sheets for vitreous enameling. Great Lakes Steel Co., Detroit.

Micro Film Alloy: Solder fill alloy; can be brushed, dipped, line feed, point feed, area feed and sprayed at 220° to 500° F. Fusion Engineering Co., 1836 Euclid Ave., Cleveland.

Micro Precision: High-speed small precision spiral flute twist drills in diameters 0.0059 to 0.0394 in. Chicago-Latrobe Twist Drill Works, 411 W. Ontario St., Chicago 10.

Microcast: Precision castings from high melting point alloys. Austenal Laboratories, Inc., 224 E. 39th St., New York 16.

Microdial: Hydraulically actuated bore honing machines equipped with means to automatically compensate for abrasive wear during the honing operation. Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 4.

Microfinish: Accurate, high-quality bore and cylindrical surface finishes produced by honing operations which use rotary and multiple reciprocating motions. Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 4.

Micro-Form Grinder: Profile grinder utilizing a microscope and pantograph to produce precision profiles from a drawing. Sheffield Corp., Box 893, Dayton 1.

Microhone: A bore and external cylindrical honing process in which rotary and multiple reciprocating motions are used to produce extremely accurate, fine-quality surface finishes. Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 4.

Microid: Silent shaking machine for reagent bottles. Griffen & Tatlock Ltd., Kemble St., W.C.2, London.

(*To be continued next week*)

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renounce civilization in rather practical terms. The Soviet Government apparently fears that the uneasy and sensitive Russian youth may catch the virus of apathy from some writers.

On the other hand, the pose of political indifference comes undoubtedly closest to political opposition, where no political opposition can be expressed directly. This, then, is an additional reason for the campaign against the nonpolitical. And so—like the Puritans who once "made the people eat religion with their bread—the ruling men of Russia are now insisting that the Soviet people should eat their bread with ideology.

Dutch Plan Farm Tool Plant

Washington

• • • **Plans are in** the advanced stage for construction of a factory in Holland for the manufacture of agricultural implements and tools, according to The Netherlands Embassy. Needed industrial machinery for tooling up the new enterprise will be imported.

Dutch farmers are urgently in need of plows and the shortage in this category alone exceeds 20,000 units, officials said. All flooded areas have now been drained.

Prior to the war, Dutch imports of agricultural machinery and implements totaled about $1,130,000 annually of which approximately 60 pct was imported from Germany.

Metallurgical Aspects Of Cemented Carbides

(CONTINUED FROM PAGE 45)

compositions and comparable differences will be found. There is a greater tendency toward porosity and grain growth in compositions of this type so that even wider differences in structure will be found. Fig. 9 is of a very porous area encountered in such a composition while fig. 10 shows the excessive grain growth often encountered. Fig. 11 is of a preferred material showing sound structure, uniformity of grain size and not too excessive average grain size.

The direct correlation of the wide differences in structure with differences in tool performance has been found in controlled cutting tests, but what is more important, this superiority has been clearly demonstrated over a period of years on many types of cutting operations. This would be expected from considerations of the effects of these wide differences in structure.

Cemented carbide compositions of proper structure possess some very unusual properties which are of interest in other than tool applications. The range of some typical properties is listed in table III. These properties may be widely varied by choice of composition but the maximum combination of properties for any given composition can only be obtained with a sound structure. Many applications of carbides have been made which were not possible with the weaker structures.

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TABLE III

Range of Physical Properties Obtainable from Cemented Carbide Compositions

Hardness, Ra	85.0 to 94.0
Hardness, Rc	66.0 to 84.0
Trnas. rupture strength, Psi	400,000 = 125,000
Modulus of elasticity, Psi	70,000,000 = 100,000,000
Compressive strength, Psi	500,000 = 1,000,000
Torsion shearing stress, Psi	Up to 190,000
Specific gravity	5.5 = 15.25
Coeff. of thermal expansion	2.5 = 5.0 x 10^{-6} per °F

Weekly Gallup Poll

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estate, more think prices will stay where they are than think they are going up even higher.

A table showing the vote of the people who think prices are going to stay where they are, or go even higher.

	Those Who Think Prices Are Not Going Down		
	Think Prices Will Rise Pct	Think Prices Will Stay About Same Pct	Total who think prices are not going down Pct
Food	20	26	46
Rent	48	35	83
Clothing	26	29	55
Automobiles	41	29	70
Mfg'd goods—radios, refrigerators	35	30	65
Real estate	22	34	56

●

• • • **Among the many things** which conspire to produce a nationwide economic recession or depression is the state of mind of the man-on-the-street.

The public's state of mind right now is not conducive to a depression this year. A large majority of the people are optimistic about 1947. in spite of the groans emanating from some of the best economists in the country.

This is not to say that some of the dire predictions concerning 1947 will not come true; it merely means that most members of the public do not see eye-to-eye with the experts and that if a depression does come in 1947, it will have come in spite of a healthy public state of mind.

Public thinking about a depression during 1947 adds up like this at present:

The great majority among the U. S. public don't think there will be a depression in 1947. The one-third who say they think we're heading into trouble this year split on the question of how serious that trouble is going to be.

Only one person in seven out of all persons included in the survey says he thinks we're going to be in serious business difficulties before the year bows out.

Sentiment was tested among

voters across the nation by the institute as follows:

"Do you think there will be a business depression in 1947?"

	Pct
Yes	31
No	60
No opinion	9

Analysis of the replies of men and women brings to light that women are inclined to be slightly more pessimistic than men, taken as a group. At the same time, both groups vote "No" to the question by substantial majorities. The amount of education a man has had doesn't appear to have any particular bearing upon his opinion—college people and those with grammar school education or less show about the same proportion who say they think a depression will come along this year.

People in the white collar occupations are, as a group, more optimistic than other occupation groups such as farmers, manual workers, professional and business people, although again, it should be emphasized that the majority in all groups hold an optimistic view.

CTMA Proposes Labor-Management Program

Detroit

• • • **Compulsory arbitration** of grievances, legislation designed to equalize the position of management and unions at the bargaining table and government seizure on negotiation cases where necessary to protect the public interest are included in the program proposed by the Cutting Tool Manufacturers' Assn. The program was adopted at a meeting held recently in Detroit.

E. A. Goddard, vice president of the Detroit cutting tool firm of Goddard & Goddard was elected president of the C.T.M.A. and R. H. Wolfe, president of Arrow Tool and Reamer Co., Detroit was re-elected treasurer. D. E. Van Deusen, president of Kelly Reamer Co. of Cleveland, Ohio was elected vice president.

New directors elected for a 3 year term were: Emil Gairing, president, Gairing Tool Co., Detroit; Malcolm F. Judkins, chief engineer, Carbide Div., Firth Sterling Steel Co., McKeesport, Pa.; John K. Penny, president of U. S. Broach Co., Detroit; as well as Mr. Goddard and Mr. Van Deusen.